USING EMOTIONS: BIOLOGICAL AND SOCIAL FACTORS INFLUENCING EMOTION UNDERSTANDING AND ANTISOCIALITY

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USING EMOTIONS: BIOLOGICAL AND SOCIAL FACTORS INFLUENCING EMOTION UNDERSTANDING AND ANTISOCIALITY.

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The White Rabbit put on his spectacles. “Where shall I begin, please your Majesty?’ he asked.

“Begin at the beginning,” the King said gravely, “and go on till you come to the end: then stop.”

Excerpt from *Alice’s Adventure in Wonderland*
(Carroll, 1865, p.182)

Abstract

People are guided by their emotions which in turn are a consequence of their understanding of others' emotion expressions. Their skills to read and accurately identify others' emotion expressions are a key ingredient for good emotion understanding. That is, accurate emotion identification can be considered as the first frontier of successful emotion understanding, and as the first step of a sequence which results in empathic responding. Impairment within this sequence might mean that the way people respond to their environment may not be appropriate or even cause harm to others. Children and adolescents with callous-unemotional traits have difficulties reading emotional cues correctly, specifically those cues which show others in distress. Such an impairment is thought to underlie a distinct pathway to severe and stable antisocial behaviour. Conventional methods of curbing the antisocial behaviour of children with high callous-unemotional traits such as punishment or time-out do not have the desired effect. Instead, this group of individuals seems to respond well to parental warmth and sensitive responding. Given that children start to learn early how to read and respond to emotions in an empathic manner through interactions, parents have a potential role by intervening early to foster good emotional and social skills even in children with high callous-unemotional traits.

Study 1 tested whether adolescent boys with high callous-unemotional traits exhibit an impairment that is specific to distress cues such as fear, sadness or pain as difficulties to recognise such cues in others may impair typical inhibition to behave in an antisocial manner. In Study 2, it was expected that successful parental scaffolding is dependent on parent's own emotion understanding skills, and

therefore, study 2 investigated ways in which parents can scaffold emotion understanding in typically developing children, e.g. through talking about others' emotion states and through engaging children in mutual eye gaze. Study 3 examined the impact that varying levels of child callous-unemotional traits have on parent-child interaction. Specifically, it was of interest whether children with high callous-unemotional traits are willing to engage with their parents on an emotional level permitting successful parental scaffolding. Parental understanding of emotions was tested in terms of promoting parental sensitive responsiveness.

In sum, there are three main points the present thesis contributed: first, findings of Study 1 and 3 support a theory of emotion processing impairment that is not specific to fear or sadness, but describe a broader impairment of a failure to engage with the emotional environment and attend to salient emotional stimuli. Second, this thesis confirms the value of studying callous-unemotional traits in adolescents and young children as well as their parents. Third, findings of Studies 2 and 3 support the important role parents play in the lives of their children with callous-unemotional traits, specifically through their own emotion understanding.

Declaration

I, Susanne MacLellan, confirm that the work undertaken for the present thesis is my own unless referenced in the text to the contrary. Also, the work in this thesis is based on research carried out at the School of Psychology, University of Central Lancashire (Study 1), and at the Department of Psychology, University of Durham (Study 2 and 3). No part of this thesis has been submitted elsewhere for any other degree or qualification.

Publications

The study presented in CHAPTER TWO was published as the following:

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CHAPTER ONE – INTRODUCING CALLOUS-UNEMOTIONAL TRAITS AS A DETERMINANT OF A DISTINCT PATHWAY TO CHILD AND ADOLESCENT ANTISOCIAL BEHAVIOUR.

1 Overview

Callous-unemotional traits are characterised by a lack of empathy, remorselessness and an unemotional interpersonal style, and resemble the "affective-personal or core features" of adult psychopathy, a personality disorder also associated with early impulsive and severe antisocial behaviour (Fowles & Dindo, 2006, p.14). These callous-unemotional traits designate a subgroup of antisocial children and adolescents (Frick & Moffitt, 2010; Frick, Cornell, et al., 2003; Frick & Dickens, 2006; Frick, Ray, Thornton, & Kahn, 2013; Frick & White, 2008). The present thesis argues that it is the lack of empathy which is rooted in the unique way this subgroup perceives and processes their emotional environment that underpins their behaviour. In order to demonstrate this, first, the importance as well as problems of studying callous-unemotional traits in children and adolescents are considered. Next, the roles of empathy and emotion recognition in behavioural decision-making generally are considered. Then, these are reviewed in connection with the emotion processing impairments related to callous-unemotional traits, and in connection with antisocial behaviour associated with callous-unemotional traits in adolescents and children. Previous research has confirmed that high levels of

callous-unemotional traits in children and adolescents are associated with an impairment in recognising distress expressions specifically. In contrast, other research has confirmed impaired emotion recognition which is not limited to distress. The present thesis sought to clarify the nature of this impairment. In tackling this question, there will also be a review of different models which describe possible mechanisms underlying this impairment.

Further, children typically learn to read and understand emotions from early on through interacting with their parents who scaffold their child's emotion understanding in this way. In the present thesis, it is argued that parental scaffolding is dependent on parent-child mutual responsiveness. Specifically, the present thesis will argue that the success of parent-child mutual responsiveness varies as a function of the child's temperament, such as callous-unemotional traits. To demonstrate this, aspects of parent-child interactions, such as mutual eye gaze, will be considered in connection with callous-unemotional traits. Finally, questions will be raised as to whether callous-unemotional traits as temperamental traits are immutable and whether parents can provide protective factors which can scaffold the emotion understanding in children with callous-unemotional traits.

1.1 Psychopathic Traits in Children: The Value of Studying Callous-Unemotional Traits

Emerging research of callous-unemotional traits within antisocial behaviours in children and adolescents is vital for two reasons. First, callous-unemotional traits

in childhood and adolescence can pose a greater risk of developing psychopathic traits later in adulthood (Burke, Loeber, & Lahey, 2007; Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007) suggesting an important link to adult psychopathy. Second, not all children and adolescents who behave antisocially are motivated to do so for the same reasons. They are made up of a heterogeneous group characterised by different causal pathways and motivations for antisocial behaviour (Frick & Marsee, 2006). Callous-unemotional traits describe one such pathway to antisocial behaviour which is shaped by a lack of empathy and remorse, uncaringness for others' well-being and shallow affect (Frick et al., 2013; Frick & White, 2008). This section will explore the heterogeneity of antisocial behaviour in more detail with a focus on callous-unemotional traits, and then move to discuss problems extending the psychopathy construct into childhood and adolescence.

Callous-Unemotional Traits as One Pathway to Antisocial Behaviour

Consistent findings confirming a heterogeneity within adolescent antisocial behaviour in regards to developmental pathways and causes (Frick, 2006; Frick & Dickens, 2006; Lahey, Moffitt, & Caspi, 2003) led to different approaches to identify homogenous subgroups of antisocial adolescents. A meaningful distinction has been found in the onset time of conduct disorder (APA DSM-5), specifically between adolescent-onset and childhood-onset (Moffitt & Caspi, 2001). This distinction also suggests different outcomes; that is, whereas adolescent-onset antisocial behaviour develops alongside puberty and is often limited to adolescence, antisocial behaviour which emerges early in life often result in life-course persistent antisocial behaviour. There is a further distinction within childhood-onset antisocial behaviour between the risk factors of the child's social context (Frick & Dantagnan, 2005), e.g. family

dysfunction or deviant peers, and the child's own characteristics, e.g. child temperament. It is within the childhood-onset group where callous-unemotional traits designate a distinct group of children with a consistent pattern of antisocial behaviour (Frick & White, 2008). The introduction and integration of the callous-unemotional specifier, within the criteria of conduct disorder in the most recent revised version of the Diagnostic Standard Manual 5th Edition (DSM-5; APA, 2013), reflects the heterogeneity of antisocial behaviour in adolescents and children and the rejection of the *one-size-fits-all approach*, since callous-unemotional traits only describe one distinct pathway to antisocial behaviour.

It is not the first time that subtypes of conduct disorder have been considered, specifically a subtype of antisocial behaviour arising from a lack of empathy. Revisions in the DSM 3rd edition (APA, 1980) included conduct disorder subtypes of an undersocialised aggressive group, characterised by individually initiated physical violence towards others, manipulative behaviour and a lack of care for others (later solitary type, DMS-3R; APA, 1987), and of a socialised delinquent group of adolescents, exhibiting group-orientated delinquency with or without physical aggression and a close relationship with deviant peers. However, this distinction between subtypes of conduct disorder was later replaced by the timing of onset in the DSM-4 (APA, 2000) because the undersocialised aggressive group was still considered a very heterogeneous group, and thus not sufficiently defined for a secure diagnosis. However, the interpersonal and behavioural characteristics of the undersocialised aggressive subtype appear very similar to those of callous-unemotional traits today (Quay, 1993). In comparison to the undersocialised aggressive subtype, callous-unemotional traits are more defined and centre around an interpersonal style which is uniquely remorseless, unemotional, manipulative and

lacking in care, and which is related to a distinct emotional experience and processing of their environment (Fanti, Panayiotou, Lombardo, & Kyranides, 2015). Therefore, callous-unemotional traits are a better specifier for conduct disorders. The advantage of the concept of callous-unemotional traits is that it is based in adult psychopathy, a well-researched and relatively tight construct, making the studying of callous-unemotional traits a worthwhile contribution for finding a homogeneous group of antisocial adolescents. This is why the research of a callous-unemotional pathway to a severe pattern of antisocial behaviour is a promising research strategy providing a better of understanding of the origin, risk factors and protective factors of antisociality.

An examination of the characteristics of antisocial behaviour exhibited by children and adolescents with callous-unemotional traits shows that their behaviour is also qualitatively different to that of antisocial children and adolescents without callous-unemotional traits (Frick, Stickle, Dandreaux, Farrell, & Kimonis, 2005; Frick & White, 2008). The behaviour of these children and adolescents seems more aggressive, severe, stable and difficult to treat (Frick & White, 2008). Frick and colleagues (2005) found that adolescents with callous-unemotional traits accounted for more than half of the contact with the police, were involved in more incidences of delinquency and generally showed the highest rates of conduct problems at each of four yearly assessments. The increased stability and severity of their antisocial behaviour is associated with their lack of empathy which closely resembles the affective and interpersonal factor of the Psychopathy construct (Fowles & Dindo, 2006). Indeed, psychopathy in adulthood is associated with a distinct type of severe and remorseless antisocial behaviour which clearly differentiates itself from non-psychopathic, emotionally driven, antisocial behaviours (Frick, 2009). This has

implications for interventions and treatment of antisocial behaviour in these individuals. Children and adolescents with callous-unemotional traits show reduced responsiveness to common treatments such as behaviour therapy (Waschbusch, Carrey, Willoughby, King, & Andrade, 2010) and conventional parental discipline such as time out (Hawes & Dadds, 2005). Therefore, this distinction calls for a different approach when dealing with their behaviour: one which addresses their lack of empathy.

Given that children and adolescents with callous-unemotional traits are at greater risk of developing adult psychopathy associated with a life-persistent course of antisocial behaviour, it is important to study these traits from early on. To demonstrate that children and adolescents can already exhibit comparable callous, unemotional and remorseless tendencies as found in adult psychopathy (Frick & Moffitt, 2010; Frick, 2009), Frick described a particular experience with a child who was highly callous and unemotional (Bower, 2006). A ten year old boy was referred to Frick because the boy attacked and killed a cat by slowly cutting it into slices. The boy explained that he wanted to see how long he could continue cutting the animal until it died. Most bewildering in this encounter was that the boy was not at all distressed about the incident. He merely seemed annoyed about having had to meet with Frick to discuss the incident. Behaviours such as this seem so strangely cold and show the same tendencies as in adult psychopathy (e.g., Cleckley, 1988; Hare, 1999). This extension of the construct of adult psychopathy into childhood and adolescents encourages the investigation of early risk factors and protective factors without the confounding issues of a life-long history of antisocial behaviour which may distort the picture (Frick & Marsee, 2006). What is striking in this account by Frick and colleagues is that the boy's uncaring and cold-blooded behaviour made his

aggressive behaviour seem more extreme and violent. It is the unique lack of empathy and remorse, as well as a shallow affect, which distinguishes this form of antisocial behaviour from those who are 'hot-headed' and reactive, and behave in an antisocial manner because of emotion dysregulation. Also, a biological background underpinning the cognitive and affective mechanisms driving the behaviour associated with psychopathy in adults supports the hypothesis that a psychopathic personality disorder develops early.

Problems Extending the Construct of Psychopathy into Childhood and Adolescence

Conversely, it should be mentioned that an extension of this construct into childhood and adolescence also has its problems and should be considered in relation to our current understanding of child and adolescent development (Romer, 2010). What kind of difficulties do researchers and clinicians face when extending psychopathy into childhood? Some point out that many children may show callous-unemotional tendencies as part of normal development (Salekin & Lynam, 2010). That is, high callous-unemotional individuals seek out novel experience and demonstrate sensation seeking behaviour (Frick, O'Brien, Wootton, & McBurnett, 1994) which is in line with heightened impulsive and hyperactive behaviour associated with these traits (Lynam, 1997). However, there is a normal degree of thrill-seeking and compromised moral-conventional decision-making as part of discovering and establishing an identity at a juvenile age (e.g. Arnett, 1992; Arnett, 1996). This idea is also in line with adolescent brain development (Romer, 2010). The concern of Seagrave and Grisso (2002), therefore, was that callous-unemotional symptoms may be overrepresented in such a young population for whom the

development of empathy is still in process since adolescents still face new emotional and moral experiences almost daily. However, some differences in behaviour are evident. For instance, it is children with callous-unemotional traits who are more at risk of substance misuse, including illegal drugs, in comparison to their peers without callous-unemotional traits (Andershed, Gustafson, Kerr, & Stattin, 2002; Fanti, 2013). Additionally, there is criticism that research and application of the psychopathy construct within childhood and adolescence could run the risk of branding those with early signs of callous-unemotional traits as psychopathic and untreatable for life (Hart, Watt, & Vincent, 2002). Therefore, research of callous-unemotional traits in children needs to keep in mind that their personality is still developing. In spite of these problems outline here, when extending the construct of psychopathy into childhood and adolescence, Frick and Marsee (2006) justifiably point out that "it is only through such research that we can eventually determine the appropriate uses for the construct in applied settings with youth" (p. 368).

In addition to problems of developmental overlap, research into child and adolescent callous-unemotional traits also encountered problems of comorbidity of psychopathology (e.g. Woodworth & Waschbusch, 2008). This can present a challenge for defining a concise construct of callous-unemotional traits. For instance, in a study to test the importance of the impulsivity factor for child psychopathy, children with high levels of Hyperactivity/Impulsivity/Attention Problems (HIA) and high levels of conduct problems showed higher tendencies of callous-unemotional traits in comparison to children with only high HIA; such children were also found to be most delinquent, antisocial and impulsive (Lynam, 1997, 1998). For research into disruptive adolescents, who were recruited in order to oversample those with high callous-unemotional traits, the comorbidity of HIA, as in Attention Deficit

Hyperactivity Disorder (ADHD), and conduct problems is a serious issue, as Woodworth and Waschbusch discovered (2008). Conduct problems show a considerable overlap with ADHD. Attention Deficit Hyperactivity Disorder was found to be related to increased reactivity when viewing negative emotional stimuli (Loney, Frick, Clements, Ellis, & Kerlin, 2003), and thus, could potentially distort findings of a low emotional response in callous-unemotional traits. Results such as the above imply that the construct of callous-unemotional traits in children and adolescents is not a clear-cut construct yet, but is found intertwined with other psychopathological symptoms such as HIA. This stresses the importance of untangling this construct to identify what is key, and what makes the behaviour of these children and adolescents with high callous-unemotional traits so distinct.

Previous research has made a good case that the investigation of callous-unemotional traits in children and adolescents is a worthwhile investment. Nevertheless, there are problems in determining exactly how these individuals differ from others without callous-unemotional traits as behavioural characteristics appear similar; that is, different pathways can lead to similar behavioural outcomes (i.e. equifinality). Also, the adult psychopathy construct and child/adolescent callous-unemotional traits as the extension of the psychopathy construct cannot be measured and treated in an equal manner. Children with callous-unemotional traits are not psychopaths. The personality of children and adolescents can still develop. Some describe psychopathy in children as a painting by Monet; that is, a "fine from a distance; but the closer you get, the messier it looks" (Hart et al., 2002, p.241). What research has shown about this group of children and adolescents is that they have difficulties processing and responding to aspects of their emotional environment in a typical manner, specifically in regards to aversive cues, which is thought to be

related to a lack of empathy. It is a good understanding of other's emotions that guide empathic responding. Hence, it is a lack of processing their emotional environment accurately that is considered key to their callous and unemotional interpersonal behaviour. However, there are still considerable gaps in our knowledge as to how exactly they perceive and experience their emotional environment. The following will explore the importance of emotion understanding for behavioural decision-making as well as the unique affective experience associated with callous-unemotional traits.

1.2 **Emotions: A Guide to Behaviour.**

Emotions can come as a response to stimuli that could be harmful or beneficial. Emotions mediate and act as a guide between the emotional environment and behaviour, specifically indicating to what extent a behavioural approach or avoidance is required (Nummenmaa, Hirvonen, Parkkola, & Hietanen, 2008). Distress expressions in another person's face or body language can function as punishment or aversive cues. People typically process punishment cues as a sign of warning or a threat that behaviour may have negative consequences, such as causing harm to others or result of punishment, and are thus to be avoided. Therefore, people respond to harming another person by experiencing negative emotions, such as guilt and remorse upon seeing the other person's expressions of distress and hurt, e.g. via facial expressions. Thus, processing and recognising emotion expressions in other's faces accurately is the first step to responding to another's distress with concern and

care. Without the initial recognition of the distress, the observer has difficulty in realising that caring behaviour may be needed. Hence, it is empathy that connects emotion cues with an appropriate response. The following will consider specific mechanisms that connect recognition of emotions with empathic responding.

Empathy has been predominantly described as an affective response triggered by another person's emotion state or situation (Hoffman, 2001; Miller & Eisenberg, 1988) and as "the capacity to think and feel oneself into the inner life of another person" (Kohut, 1984, p. 82). Other researchers are more specific, indicating that empathy is the ability to understand and share in another person's emotions even though the other's emotion state may differ from one's own (De Waal, 2008; Deschamps, Schutter, Kenemans, & Matthys, 2015). These definitions of the empathy concept are mostly focused around a vicarious experience following the observation of another person's emotion expressions; however, empathy also includes a cognitive component, i.e. the understanding of another's emotion expressions (Deschamps et al., 2015; Preston & De Waal, 2002) and even includes perspective-taking (De Waal, 2008). The individual, as an observer of his or her social and emotional surroundings, is constantly exposed to emotional signals in the environment. According to the theory of basic emotions (Ekman, 1992), this is in the form of vocal cues, facial cues, e.g. eyebrows raised, smiling, widened eyes (Ekman, 1993; Russell, Bachorowski, & Fernández-Dols, 2003), and postural cues, e.g. arm and hand positions, upper body erect or collapsed and speed of movements (Coulson, 2004; Wallbott, 1998). It is an interplay of affective and cognitive processes that elicits an empathic response following the observation of emotional cues.

Some describe empathy as the "spark of human concern for others, the glue that makes social life possible" (Hoffman, 2001, p.3). Indeed, it is the ability to empathise with another person in a way that connects other's emotional states with one's own emotional states. For instance, viewing other's emotion expression can trigger an emotional transaction what is termed emotional contagion, which occurs when the observer's emotional experience matches that of the observed (Hatfield & Cacioppo, 1994): they can experience either the same or a complementary emotion as the observed (e.g. fear of being hurt when the observed is angry). Emotion contagion can be evident through neural (Decety & Jackson, 2006) and affective processes (Bechara & Damasio, 2005; Damasio, Everitt, & Bishop, 1996) as well as matching motor action between the observer and the observed (Dimberg & Thunberg, 2012; Dimberg, Thunberg, & Elmehed, 2000). Jackson and colleagues (2005) discovered that identical brain structures in the observer, such as the premotor cortex where the mirror neuron system is based, are activated when experiencing first-hand pain and when viewing others in pain. In addition, emotion contagion can also occur as facial mimicry when people view others talking about emotional events and showing emotional expressions. In these instances, people unconsciously mimic the observed facial expressions. People report feeling similar or complementary emotions upon observation of emotional facial expressions (Dimberg & Thunberg, 2012; Hsee, Hatfield, Carlson, & Chemtob, 1990). This is in accordance with the facial feedback mechanism (Dimberg & Thunberg, 2012; Hatfield & Cacioppo, 1994). Through this mechanism, motor mimicry of facial expressions, which happens automatically upon perception, can elicit an empathic response by receiving emotional feedback through experiencing the same or complementary emotion as the observed (de Wied, van Boxtel, Zaalberg, Goudena, & Matthys, 2006). For instance,

an angry face directed towards the observer can induce an excitatory effect which can trigger aversive conditioning and a behavioural response of avoidance (Dimberg, 1986).

The extent and nature of emotional contagion happening as a response to another person's emotion expressions is also dependent on past experiences (Hoffman, 2001). It is considered in part a learned process. Typically through social learning which is facilitated by the desire to avoid negative consequences, children learn early that some behaviour has harmful consequences for others and/or for themselves. An emotion expression, such as an angry face, becomes associated with the fear of getting hurt or punished over time. This is known as aversive or fear conditioning. When it comes to social learning, fear plays an important role. The fear and anticipation of experiencing pain or punishment contribute to a change of behaviour in the long-term. This process of triggering an emotional response to threat cues which is associated with a harmful outcome before it actually happens is central to aversive or fear conditioning. Through repetition of this process, a fear or aversive conditioned emotional response helps people to recognise certain cues as threat cues and to respond to such cues by avoiding them.

Additionally, people's emotional response to environmental emotion cues, such as motor mimicry, occurs under the condition that they pay attention to the another person's emotion expressions (Hess & Fischer, 2013). Engagement of attention is also dependent on the observer perceiving emotional cues, such as another person's expression of distress, as threat cues, and to allocate attentional resources to such cues. People's perception of threat and aversive cues is preceded and associated with a physiological arousal which in turn depends on the observer's temperament. For instance, a temperament capable of a healthy fear response

recognises threat stimuli as something to attend to and potentially inhibit behaviour (Kochanska, 1993). On the one hand, too much arousal is not beneficial. A person may be more likely to associate the arousal with the source, e.g. the harsh salient parent who punishes the child, rather than the actual wrongdoing. This has important implications for social learning. On the other hand, if arousal is too low, the observer shows a lack of attention to salient cues which can interfere with identifying another person's emotion state. This is characteristic of a fearlessness temperament and often associated with child and adolescent callous-unemotional traits. Indeed, children and adolescents in previous research demonstrated an impairment to recognise another person's expression of distress accurately (Blair, Colledge, Murray, & Mitchell, 2001) and to pay attention to other's distress (Kimonis, Frick, Munoz, & Aucoin, 2007). The following section will discuss different mechanisms underlying such an impairment exhibited by this group of children and adolescents.

1.3 Unique Affective Processing in Callous-Unemotional Traits: a General or Specific Impairment of Emotion Understanding?

The callous-unemotional subgroup of antisocial individuals does not only differ in behaviour, but also in the way they process environmental cues; that is, they have difficulties in recognising some environmental cue as aversive cues. People who process environmental cues accurately demonstrate successful decision-making, through approaching a stimulus associated with reward or by avoiding a stimulus associated with punishment (Finger et al., 2011). Children and adolescents with

callous-unemotional traits are insensitive to punishment, but they are sensitive to reward (Centifanti & Modecki, 2013; O'Brien & Frick, 1996; Scerbo et al., 1990). Paradigms such as passive avoidance (i.e. people avoid stimuli associated with punishment and approach stimuli associated with reward) and reversal learning (i.e. people adjust behaviour as reward and punishment stimuli change) are reliant on identifying such cues so as to avoid responses that lead to frustration, loss and punishment. Children and adolescents with high levels of callous-unemotional traits do not learn to avoid such punishment as they do not fear and worry about a negative outcome (Finger et al., 2011). Therefore, they fail to adapt their behaviour when a response no longer results in reward, and fail to avert future loss and frustration (Blair, Mitchell, Leonard, et al., 2004; Finger et al., 2008; O'Brien & Frick, 1996). Such a failure to respond to punishment cues in children and adolescents with callous-unemotional traits is attributed to a fearless temperament (Lykken, 1957), and thus is consistent with an impaired Violence Inhibition Mechanism (Blair, 1995) and with an impaired Behavioral Inhibition System (Fowles, 1980; Gray, 1976) which both result in reward-seeking behaviour and a failure to avoid response-contingent punishment. Given that this group of children and adolescents do not have a temperament capable of a healthy aversive response to threat cues, they do not recognise and process such cues accurately.

Consistent with this idea, children and adolescents with high levels of callous-unemotional traits do not perceive negative emotional cues such as distress shown by another person as aversive, and therefore do not seek to avoid distress in others. This is because children and adolescents with high callous-unemotional traits have shown difficulties in accurately identifying emotion expressions, specifically, fear and sadness (Blair, 1999; Blair et al., 2001) and to respond to distress stimuli

(Kimonis et al., 2007). Evidence of an emotion processing impairment, however, is not consistent across the body of research (Wilson, Juodis, & Porter, 2011). Rather, findings ranged from a fear deficit (Blair, Mitchell, Peschardt, et al., 2004; Blair et al., 2002; Sylvers, Brennan, & Lilienfeld, 2011) to problems with disgusted faces (Kosson, Suchy, Mayer, & Libby, 2002) to no deficit at all (Glass & Newman, 2006; Richell et al., 2003). Since the accurate processing of emotion expressions shown by another person is key for successful empathic responding, much research has aimed to ascertain why this group of children and adolescents exhibit an impaired emotion processing.

Two possible explanations follow these findings of an emotion processing impairment: first, this group of children and adolescents display a selective emotion processing impairment, that is focused on distress emotions such as fear and sadness (Blair et al., 2001; Dadds et al., 2006; White et al., 2016). Second, children and adolescents with high callous-unemotional traits exhibit a general impairment of emotion processing, i.e. involving more than just fear and sadness (Brook, Brieman, & Kosson, 2013; Dawel et al., 2015). Consistent with the emotional dysfunction hypothesis (Blair, Jones, Clark, & Smith, 1997), the first explanation focuses on impaired emotion response which is thought to disrupt aversive conditioning based on a fearless temperament. In line with the selective attention hypothesis (Baskin-Sommers, Curtin, & Newman, 2011), the second explanation focuses on a failure to shift attention to the most salient stimuli because such stimuli are not considered goal-relevant for the individual. There is strong evidence to support either hypothesis which will be introduced in the following.

Emotion Dysfunction Hypothesis

Evidence to support an emotional dysfunction specific to fear and sadness indicated a lack of emotional responsiveness when children and adolescents are presented with distressing stimuli (Frick et al., 2013; Kimonis et al., 2007). Specifically, recent research found an attenuated startle potentiation in adolescents with high callous-unemotional traits when they viewed fear imagery in films, such as violent scene, in comparison to adolescents with low callous-unemotional traits who showed great physiological and behavioural response to such imagery (Fanti et al., 2015). In addition, adolescents with high callous-unemotional traits show a low emotional response to similar scenes, which is manifested as reduced electromyographic reactivity of the corrugator muscle (de Wied, van Boxtel, Matthys, & Meeus, 2012). It is the automatic response of the corrugator muscle that is associated with the processing of another person's angry face (de Wied et al., 2006). Such impaired facial muscle mimicry suggests that the facial feedback mechanism (Dimberg & Thunberg, 2012) is also impaired in individuals with high callous-unemotional traits. Reduced facial mimicry in these individuals, e.g. to angry faces, may also be due to insufficient attention to the threat stimulus itself because they do not experience such stimulus as threatening and are not scared of such stimulus (Dadds, El Masry, Wimalaweera, & Guastella, 2008).

Further evidence to support an emotion dysfunction hypothesis revolves around a failure to look at features of another person's face thought to convey distress, such as the eyes, associated with high levels of callous-unemotional traits in children (Dadds et al., 2008). Looking at another's eye region seems to be important for identifying fearful faces (Gamer & Büchel, 2009). Previous research has demonstrated that children with high callous-unemotional traits failed to look at

another person's eye regions, unless directed to do so, and also exhibit impaired identification of fearful expressions (Dadds et al., 2008). Also, young children with high callous-unemotional traits at the age of 4 and 5 years demonstrated reduced eye gaze towards their parents (Dadds et al., 2014; Dadds, Allen, et al., 2012; Dadds, Jambrak, Pasalich, Hawes, & Brennan, 2011). In addition, evidence that reveal difficulties processing distress in others and a failure to attend to other's eyes in this group of children and adolescents may be attributed to abnormal neurobiology involving the amygdala (Contreras-Rodríguez et al., 2014; Decety, Chen, Harenski, & Kiehl, 2013; Jones, Laurens, Herba, Barker, & Viding, 2009; Larson et al., 2013; Marsh et al., 2013; Marsh et al., 2011). This theory was based on evidence obtained through testing individuals with bi-lateral amygdala damage who also demonstrated a deficit in recognising fear in others' faces similar to that displayed by children and adolescents with high callous-unemotional traits. It is thought that the amygdala is a key neural structure for drawing attention to the eye regions (Gamer & Büchel, 2009). In line with this research, neuro-imaging findings involving children with callous-unemotional traits have demonstrated a lower reactivity of the amygdala in response to fear stimuli (Marsh et al., 2008). Although the present thesis did not investigate neural functioning associated with callous-unemotional traits, this evidence suggests that a specific fear processing impairment may be founded in a lack of attention to salient stimuli such as the eye regions.

Selective Attention Hypothesis

Such a lack of attention to another person's eyes can also be explained by the selective attention hypothesis (Baskin-Sommers et al., 2011). In contrast to an emotional dysfunction, selective attention mostly attributes a cognitive impairment

to the emotion processing associated with callous-unemotional traits (Hiatt & Newman, 2006). It suggests that attention is paid to objects, people and situations which are consistent with the individual's personal goal, which can often deviate from that of other individuals. For instance, individuals with high callous-unemotional traits do not experience other's fear expressions as a threat which needs to be avoided, and thus, they do not pay attention to salient stimuli such as other's eye regions. Thus, attending to other's eyes becomes goal-irrelevant as they do not care about such a threat. If there is a conflict between the individual's personal goal and attention to salient stimuli, primary and important cues can become secondary cues competing for attention and leaving little space for processing other important information, such as information relevant to the emotional and social situation (Baskin-Sommers, Curtin, & Newman, 2013). Typically, an attention bottleneck helps to filter distractions or secondary cues in order to keep the individual focused on primary cues via the relevance of the stimuli (Baskin-Sommers et al., 2013). In the case of callous-unemotional traits, the relevance of the stimuli may be dependent on the nature of stimuli themselves(Dadds et al., 2015; Yoon & Knight, 2015). This is also consistent with impaired passive avoidance and reversal learning associated with callous-unemotional traits (Finger et al., 2011; Finger et al., 2008). Response-contingent punishment is competing here with response-contingent reward, and reward tends to have the upper hand in the end.

Finally, there is also evidence to support that the emotional dysfunction and selective attention hypothesis overlap and are interdependent (Larson et al., 2013) in order to explain an impaired emotion processing associated with high levels of callous-unemotional traits. Specifically, previous findings revealed that fear processing can be moderated through manipulation of attentional focus and timing of

presenting information on emotions (Baskin-Sommers et al., 2011, 2013; Larson et al., 2013) pointing towards an interaction of attention and emotions. Further research is needed to determine how children and adolescents process their emotional environment.

1.4 Parental Scaffolding of Child Emotion Understanding: Can Children with Callous-Unemotional Traits also Benefit?

Interaction with parents is essential as children encounter novel situations and objects which can cause uncertainty in how they should respond to avoid becoming upset by them (Aksan & Kochanska, 2004). When the child first approaches a novel situation or object, he or she seeks the feedback from the parent as to whether he or she should avoid or approach the situation or object (Kochanska, 1993). This is consistent with social referencing (Hirshberg & Svejda, 1990). Parents can give feedback through emotional expressions. In this way, the child learns to associate reactions of distress with wrong-doings and reactions of joy with prosocial activities. Also in this way, parents can *scaffold* (Wood, Bruner, & Ross, 1976) their child's developing emotion understanding. Parental *scaffolding* can best be understood as a process of teaching children about emotions by modifying a task or providing more information on the child's emotional environment so that the child can understand and master a situation on their own (Hammond & Carpendale, 2015). For instance, parents can *scaffold* the child's emotion understanding by engaging the child's attention to emotions as parents talking about other's mental states (Hammond, Müller, Carpendale, Bibok, & Liebermann-Finestone, 2012; Harris, de Rosnay, &

Pons, 2005; Svetlova, Nichols, & Brownell, 2010). The present thesis takes the view that it is through mutual and sensitive responsiveness between parents and child that facilitates successful parental *scaffolding* of the child's emotion understanding. The following will introduce mutual responsiveness between parents and children, and consider the importance of this concept for the child's developing emotion understanding. In addition, this section will also consider the influence of callous-unemotional traits on the interaction between parents and their children.

Mutual Child-Parent Responsiveness and Parental Scaffolding

In previous research, parental responsiveness and beliefs towards the child's emotion expressions and experience was hypothesised to shape the success of the parent-child interactions, and consequently, the success of parental *scaffolding* (Castro, Halberstadt, Lozada, & Craig, 2015; Kochanska & Aksan, 2004). Yet increasingly, research identifies that parents and child mutual and sensitive responsiveness towards each other fuels successful interaction. However, parent's sensitive responsiveness towards their child, characteristic of parental warmth and acceptance of the child's emotions, is considered a critical factor for developing a mutually responsive relationship itself as parents encourage a willingness in their child to engage with them. In turn, this encourages the child to embrace the parental guidance on emotions facilitating *scaffolding* of the child's emotion understanding. In this way, parents and child feel secure and enjoy spending time with each other which in turn aids the child's internalisation of parental values and emotion understanding (Kochanska, Barry, Aksan, & Boldt, 2008).

Given the important role of mutual and sensitive responsiveness, the child is considered as an active social partner in their interactions with the parents

(Kochanska, Kim, & Boldt, 2013; Kochanska, Kim, Boldt, & Nordling, 2013). This means, a willing, receptive and positive child stance towards the parent's influence is needed for mutual responsiveness. Indeed, some consider the child's willing stance to be a key mediator connecting parenting and child developmental outcomes (Kochanska, Kim, & Boldt, 2013). In previous research, the child's unwillingness to accept and respond to the parent's socialisation predicted external behaviour problems and subsequent aggressive behaviour with peers. The child's unresponsive stance would also impact the parent's own responsiveness which could lead to the parental *scaffold* collapsing. Therefore, the aim is to encourage mutual responsiveness and cooperation, which in turn promote a sharing and expressing of mutual warmth. Since the child's attitude is often under-appreciated (Kochanska, Kim, Boldt, & Nordling, 2013), parent training programs which permit the child to be an active social partner and lead the play time with the parent can improve cooperation between them. Also, following the training, parents rated their child as more socially competent. Through the training, mother and child can come to feel positive about each other. In this way, they become more willing to spend time with each other, trust each other to respond and engage with each other, thereby fostering good emotional exchange between them, and consequently enhancing the child's development of emotion understanding (Denham, 2007).

The child's willingness to engage with their parents in an emotional exchange is thought to be dependent on the child's temperament. In previous research, young children with high levels of callous-unemotional traits generally demonstrated a lack of emotional engagement with their parents (Dadds et al., 2014; Dadds, Allen, et al., 2012). Previous research has shown that preschoolers either with high and low levels of callous-unemotional traits who engage in mutually

responsive and positive relationships with their parents show reduced behaviour problems at a later point in their childhood (Kochanska, Kim, Boldt, & Yoon, 2013). Similarly, parents' warmth towards their child and positive reinforcement techniques also seem to have a beneficial effect on the behaviour of young children with a callous-unemotional disposition (Hawes, Dadds, Frost, & Hasking, 2011; Pasalich, Dadds, Hawes, & Brennan, 2011). Research on the effect of positive parenting techniques in children with a callous-unemotional disposition, therefore, is encouraging. It stresses the point that this group of children are by no means untreatable. Instead, the opposite may be true. It may be that the early emotion understanding of these children can be supported through sensitive and responsive parenting. Better emotion understanding, in turn, can affect behaviour in these children.

The Significance of Eye Gaze between Parent and Child

Parental *scaffolding* of their child's emotion understanding can also be facilitated through mutual eye gaze. Specifically, parent's direct eye gaze helps the child to pay attention to salient emotional cues in their environment, such as emotional facial expressions, as their gaze directs the child's attention to such cues (Farroni, Mansfield, Lai, & Johnson, 2003; Farroni, Massaccesi, Menon, & Johnson, 2007). This is essential when looking at the facial emotion expression of another person. For instance, there are various elements of a fearful facial expression which convey the other person's emotion. However, the decoding of emotional expression in another's face involves a selective use of information. That is, not all of the information shown on the other's face is essential for the recognition of emotion expressions; certain features, which are the most diagnostic, become the focal point

when it comes to identifying a specific emotion such as fear (Schyns, Bonnar, & Gosselin, 2002). At the same time, attention is not as simple and *bottom-up* as it seems. Fixation on the eyes, which is considered key for identifying sadness, anger (Eisenbarth & Alpers, 2011) and fear (Gamer & Büchel, 2009; Kuhn & Tipples, 2011), is also dependent on *top-down* influences such as context and personal goals (Kuhn & Tipples, 2011). For the observer to focus on the meaningful feature, *bottom-up*, sensory-driven mechanisms and *top-down*, learned influences compete for the observer's attention (Pessoa, Kastner, & Ungerleider, 2002). It is through early socialising experiences that children learn to balance both *bottom-up* and *top-down* influences to read, and, consequently, to respond to emotional cues in an appropriate and prosocial manner (e.g. Hammond & Carpendale, 2015). Parent's attentional cueing using direct eye gaze can be key for children to understand and respond to another person's emotional state accurately.

Such attentional cueing is dependent on reciprocated eye gaze by the child, which in turn was found to be reduced in children with callous-unemotional traits. These children even show reduced eye gaze during a task when parents express their affection towards them (Dadds, Allen, et al., 2012). It was suggested that because of reduced eye gaze associated with callous-unemotional traits in children (Dadds et al., 2008), mother-child interaction and mutual responsiveness would be interrupted in this way (Dadds et al., 2014). Therefore, callous-unemotional children do not respond to the parent's attentional cueing due to a lack of attention to the parent's eyes (Dadds et al., 2011). Specifically, parents direct eye gaze plays an important role here to initiate and maintain face-to-face interaction between parent and child (Senju & Csibra, 2008) in order to guide their child's attention. In line with the idea of *scaffolding* the child's emotion understanding, the present thesis argues that

children with callous-unemotional traits lack in emotion understanding because they do not respond to the parent's attentional cueing such as parent's direct gaze. However, no known research has examined this link to date. Thus, more research is needed to test this idea.

1.5 Environmental Influence on a Temperament of Callous-Unemotional Traits

Temperament is considered to be the biological basis of behaviour (Fox, Henderson, Pérez-Edgar, & White, 2008). Other researchers describe temperament as arising "from our genetic endowment" (Rothbart, Ahadi, & Evans, 2000, p.122) which affect and is affected by the individual's experiences of his or her environment. In other words, temperamental traits can determine how individuals are affected by their environment, and also how individuals react to their environment. The lack of emotional response and attention towards others in their environment associated with a callous-unemotional temperament is based on an atypical neurobiology as mentioned before, even expecting a degree of heritability (Larsson, Andershed, & Lichtenstein, 2006; Taylor, Loney, Bobadilla, Iacono, & McGue, 2003). Indeed, Viding and colleagues (2007) have reported that callous-unemotional traits are 67 % heritable from prior generations. Subsequent studies even made a distinction between children that showed a higher level of conduct problems and callous-unemotional traits (80%) and children only with elevated levels of callous-unemotional traits (68%). In addition to a strong support for a heritable influence

underlying a callous-unemotional temperament, previous research argues that focusing on a single causal factor of behaviour such as temperament is misleading (Rutter, 2010). Early environmental influences should be considered such that biology cannot be a single determinant of behaviour. The environment can act upon the biology so that behaviour is either exacerbated or improved. A positive environment may foster an adequate level of empathy (Humphreys et al., 2015; Pardini, Lochman, & Powell, 2007), even for children pre-dispositioned with a high level of callous-unemotional temperamental traits. This points to an interaction between temperament and environment. To demonstrate this, the following will introduce two theories that explain how the environment can influence a callous-unemotional temperament.

Diathesis-Stress Hypothesis

As one theory of this interaction, the traditional diathesis-stress hypothesis would consider callous-unemotional traits as a biological vulnerability which describes a risk of developing behaviour problems when exposed to adversity (Belsky & Pluess, 2009; Kochanska, Brock, Chen, Aksan, & Anderson, 2014). Consistent with this reasoning, adolescents with high callous-unemotional traits show a high stability of traits when exposed to negative and harsh parenting, such as inconsistent punishment, poor monitoring and supervision, corporal punishment (Frick, Kimonis, Dandreaux, & Farell, 2003), and high stability of externalising problems when exposed to very stressful life events, e.g. parent's death (Frick & Dantagnan, 2005). Previous research also reported that adolescents with high levels of conduct problems and callous-unemotional traits received poorer social support from family members and peers than those adolescents with high conduct problems

and low callous-unemotional traits (Fanti, 2013). This may be because adolescents with high callous-unemotional traits do not easily form an emotional attachment to others based on their uncaring interpersonal style, and thus, are not adept to form deep relationships with others. A lack of social support may be considered an adversity and may further sustain externalising behaviour problems in adolescents with high callous-unemotional traits. Previous findings, therefore, support a diathesis-stress theory which considers children and adolescents with high callous-unemotional traits particularly vulnerable to an adverse environment.

Differential Susceptibility Theory

The diathesis-stress hypothesis has a one-sided view on the interplay of environment and temperament missing out on the impact of positive environmental influences. In contrast with the diathesis-stress hypothesis, the differential susceptibility theory is a theory describing developmental plasticity or susceptibility based on temperamental disposition and biology (Belsky & Pluess, 2009). That is, the same person who is vulnerable to adverse environmental influences could benefit from positive interactions and support from parents and peers. More specifically in connection to callous-unemotional traits in children and adolescents, this means that early interactions with parents and others can make a difference and can act on their dispositions (Hawes & Dadds, 2005, 2007), and ultimately, can influence behavioural outcomes (Daversa, 2010). Previous findings revealed that children with high callous-unemotional traits seem susceptible to warm and sensitive parenting (Waller, Gardner, & Hyde, 2013; Waller et al., 2012; Waller et al., 2014). Parent's warmth and sensitivity towards their children may have such an influential role on the children's callous-unemotional traits as such a parenting style is also important

for *scaffolding* the children's emotion understanding (Centifanti, Meins, & Fernyhough, 2015). These are exciting findings suggesting an influential role of environment for children with elevated callous-unemotional traits. More research is needed to gain a better understanding about how a positive environment can have an impact on children with a callous-unemotional disposition as suggested by the differential susceptibility theory.

Finally, an environmental effect on callous-unemotional traits is somewhat inconsistent across research. Some research has looked at the interactions between inherited, non-shared environmental and shared environmental factors (Viding, Fontaine, Oliver, & Plomin, 2009) using twin designs. It was found that for twins with a low level of callous-unemotional traits and who have received more negative discipline from their parents at age 7 moved on to misbehave at age 12. However, this effect was not discovered for twins with callous-unemotional traits suggesting a moderating role of callous-unemotional traits between environment and behaviour. In a different study, harsh and ineffective parenting was associated with increased conduct problems in adolescents with low callous-unemotional traits. However, adolescents high in callous-unemotional traits were also rated high in conduct problems regardless of ineffective parenting (Wootton, Frick, Shelton, & Silverthorn, 1997). Evidence such these again emphasise that the child is not a passive social agent in the interaction with their parents. There appears to be a bi-directional effect between parenting and callous-unemotional traits (Hawes, Dadds, Frost, & Hasking, 2011). It is a challenge to accurately investigate the effect environment can have on temperamental traits such as callous-unemotional traits. Nevertheless, such investigations hold strong a position for future research such as for intervention and treatments of callous-unemotional behaviour. The knowledge

how to outplay a callous-unemotional temperament with "suitable environmental buffering" (Viding & Larsson, 2010, p.128).

1.6 **Thesis Aims**

Children and adolescents with callous-unemotional traits have been introduced at this point as a unique group symptomatic of distinct affective experience of their environment that is reflected in impaired emotion processing and of a severe pattern of an antisocial life style (Frick et al., 2013). A pattern of severe antisocial behaviour in children is a serious risk for their mental health and for the people around them, such as for peers and family members. For that reason, it has received much attention in research into the origin and possible interventions for antisocial behaviour. Impaired emotion processing has been of specific interest as a failure to accurately identify another person's distress cues can interfere with inhibition of antisocial behaviour. Therefore, a selective inability to identify fear and sadness in others associated with callous-unemotional traits has been received much attention. However, results are not consistent across research, and are not limited to distress alone, but may point to a more general impairment of emotion understanding associated with callous-unemotional traits.

The first empirical study, therefore, aimed to investigate emotion understanding associated with callous-unemotional traits in referred adolescent boys using an emotion labelling task. In previous research, participants were asked to

label emotions conveyed by static displays of emotion expressions (e.g. Muñoz, 2009). In contrast, this first study of the present thesis made use of dynamic facial and postural emotion expressions. Dynamic expressions present a rich display of emotional state in addition to shape information as the follow the course of an emotion expression from the beginning to its peak. Additionally, pain expressions were also included. Using a number of different emotional stimuli, this study aimed to contribute to and clarify inconsistencies across the body of research concerning impaired emotion processing in adolescents with callous-unemotional traits. That is, the intention of this study was to determine whether impaired emotion processing was specific for fear and sadness giving support to the emotion dysfunction hypothesis (Blair et al., 2001), or whether there is a broad impairment reflective of reduced attention to emotion stimuli supporting the selective attention hypothesis (Baskin-Sommers et al., 2011).

The next section of this thesis considers the important role parents typically play in their young child's development of emotion understanding. Children learn about emotions through socialising with their parents with parents scaffolding their child's development. However, the success of such an interaction is dependent on the child's willingness to engage with their parents on an emotional level which in turn is dependent on the child's town temperament (Kochanska, Kim, Boldt, & Yoon, 2013). Early callous-unemotional traits in children are associated with reduced responsiveness towards their parents potentially interfering with parental scaffolding of child emotion understanding that is specific to reduced eye gaze by the child.

The second empirical study aimed to test how parents can typically scaffold their young child's emotion understanding, and whether the success of the parental scaffolding is dependent on their own emotion understanding skills. Specifically,

parent-child mutual eye gaze during a brief period when parents and child share positive affect was expected to contribute to better emotion understanding in young children. In addition, it was expected that when parents talk a lot about others' mental state talk during joint story-telling children's emotion understanding would be better. Further, the third empirical study aimed to investigate the role children's varying levels of callous-unemotional traits play within parent-child interaction. Specifically, it was of interest how children with high levels of callous-unemotional traits engage with their parents on an emotional level and whether these children show an early impairment in emotion understanding in line with previous research involving a similar aged group of children (e.g., White et al., 2016), older children (e.g., Dadds et al., 2008; Dadds et al., 2006) or adolescents (e.g., Muñoz, 2009). Based on previous research (Dadds et al., 2014), it was expected that young children with high levels of callous-unemotional traits show reduced emotional engagement even as a response to parents' affection that is specific for reduced eye gaze. In addition, the third empirical study also aimed to examine whether children with high levels of callous-unemotional traits benefit from parents' own good emotion understanding. Empirical studies two and three are the first known studies to investigate parents' own emotion understanding in relation to that of their child's and in relation to their child's callous-unemotional traits.

CHAPTER TWO – RECOGNITION OF PAIN AS ANOTHER DEFICIT IN YOUNG MALES WITH HIGH CALLOUS-UNEMOTIONAL TRAITS.

2 Abstract

Prior research on callous-unemotional traits supports an impairment in recognising fear in faces and body postures. Difficulties recognising other's emotions may impair the typical behavioural inhibition for violent behaviour. However, recent research has begun to examine other distress cues such as pain. The present study examined emotion recognition skills, including pain, of school-excluded boys aged 11 to 16 years (N=50). Using dynamic faces and body poses, the relation between emotion recognition and callous-unemotional traits using the Youth Psychopathic Traits Inventory (YPI) and the Inventory of Callous-Unemotional Traits (ICU) was examined. Violent delinquency was covaried in regression analyses. Although fearful facial and fearful bodily expressions were unrelated to callous-unemotional traits, recognition of dynamic pain facial expressions were negatively related to callous-unemotional traits using the YPI. The failure to replicate a fear and sad deficit are discussed in relation to previous research. Also, findings are discussed in support of a general empathy deficit for distress cues which may underlie the problem behaviour of young males with callous-unemotional traits.

2.1 Introduction

A callous disregard for other's feelings and a lack of remorse towards own wrong-doings is characteristic in adolescents high on callous-unemotional traits. Further, adolescents with callous-unemotional traits appear to be a distinct subgroup of adolescents with severe, early-onset and difficult-to-treat antisocial behaviour (Frick & Dickens, 2006; Frick et al., 2005; Frick & White, 2008; Munoz & Frick, 2012). Problems in identifying others' emotional expressions in adolescents with these traits may explain their inability to empathise with others. Adolescents with callous-unemotional tendencies show a distinct deficit in relation to others' distress that is specific to displays of fear (Dadds et al., 2008; Dadds et al., 2006; Muñoz, 2009) and sadness (Blair et al., 2001), which may have consequences for failing to inhibit violent behaviour (Blair, 2001). Thus, this subgroup of adolescents may hurt others because they fail to respond to others' distress in a socially appropriate manner.

The Role of Fear Recognition

Research has suggested that knowing when others are afraid is important in encouraging prosocial behaviour (Blair, Peschardt, Budhani, Mitchell, & Pine, 2006; Marsh, Kozak, & Ambady, 2007). Individuals who more accurately identified fearful facial expressions were more willing to help others in distress by giving money or their time (Marsh et al., 2007). Facial emotion expressions appear as the access point to an understanding and vicarious experience of other's emotions (Niedenthal & Brauer, 2012), and as crucial for an empathic response. Such an understanding is key to the development of empathy. Empathy may then elicit an emotionally negative or positive response to another's negative or positive emotional state, and consequently

bring about the regulation of behaviour (Campos, Thein, & Owen, 2003). In other words, other people's emotional states may function as a reward (Niedenthal & Brauer, 2012) or punishment (Blair, 1995).

Indeed, children with callous-unemotional traits show a reduced response to punishment (Blair, 2004; Centifanti & Modecki, 2013), which in typically-developing samples usually leads to a link of hurtful behaviours to causing distress or disapproval in others. In this way, people learn other's fearful expressions are aversive and so avoid making people afraid. Thus, emotional processing has taken a central position in current investigations relating callous-unemotional traits and severe antisocial and aggressive behaviour.

Research has shown, in fact, that children with callous-unemotional traits have difficulties processing fearful expressions (Blair, Mitchell, Peschardt, et al., 2004; Dadds et al., 2006). This fear deficit was found consistently on a wide range of emotional stimuli such as emotional words (Loney et al., 2003), facial cues (Dadds et al., 2006) and body postures (Muñoz, 2009). Further, in a dot-probe paradigm, Kimonis and colleagues (Kimonis et al., 2007), in a detained sample of boys (11-18 years), found that aggressive children with callous-unemotional traits failed to automatically attend to images of distress (e.g., people hurt or crying). In addition, research has shown deficits recognising sad facial expressions in children with callous-unemotional traits (Blair & Coles, 2000). Therefore, children with callous-unemotional traits show general deficits to signs of distress in other people.

The Role of Pain Recognition

Notably, regarding its emotional intensity, pain is described as distinct from other basic emotions such as anger, fear, sadness or happiness (Simon, Craig,

Gosselin, Belin, & Rainville, 2008); yet, pain may be similar to fear in that it provides necessary cues to reinforce prosocial behaviour. More specifically, it is perceived as most threatening or arousing, and yielding a high threat value. Indeed, adolescents high on callous-unemotional traits showed reduced activation in parts of the brain involved in empathic responding, as they viewed increasing pain in another person (Marsh et al., 2013). These regions consisted of the rostral anterior cingulate cortex, ventral striatum, and amygdala. Lockwood et al. (2013) also found reduced responses to other's pain in those with callous-unemotional traits to be related to similar structures (i.e., anterior cingulate cortex). For instance, neural structures such as the amygdala play an important role in empathic responding (Decety & Michalska, 2010). Thus, pain may function as part of a social communicative mechanism similar to fear and sadness (Craig & Patrick, 1985). That is, other people's displays of pain activate an aversive stimulus reinforcement mechanism, which prioritises avoidance of pain; this implicates the stimulus reinforcement deficits exhibited by adolescents high on callous-unemotional traits (Blair, 2004; Blair et al., 2006). Indeed, neural structures such as the amygdala and the anterior cingulate cortex play an important role in stimulus-reinforcement or aversive conditioning (Kosson et al., 2006).

The Present Study

These important forays into processing of pain represent a further account of the empathic impairment of adolescents with callous-unemotional traits. Although prior research has found a negative relation between callous-unemotional traits (measured as psychopathy) and sensitivity to detect another's pain in adults (Caes et al., 2012), research has not yet examined behavioural recognition of pain faces as

related to callous-unemotional traits in young males. Therefore in the present study, the aim was to widen the focus to other emotions of distress to include facial expressions of pain. In addition, dynamic faces and body postures were used to better represent real-life communication. The present study examined emotional processing in a sample of young males recruited from alternative schools, where children are referred for behavioural problems. Callous-unemotional traits were assessed using the callous-unemotional scale of the Youth Psychopathic Traits Inventory (YPI) (Andershed, Kerr, Stattin, & Levander, 2002) and also using the Inventory of callous-unemotional traits (ICU) (Frick, 2004). Prior research shows deficits in the activation of neural responses to pain are associated with callousness, in particular (Lockwood et al., 2013). The YPI callous-unemotional was created based on reports of real-life empathy; indeed, it correlates significantly with affective empathy (Dolan & Rennie, 2007). Additionally, the ICU subscales have been found to correlate with affective empathy, which refers to feeling or sharing in other people's emotions rather than just knowing about other people's emotions (i.e., cognitive empathy) (Muñoz, Qualter, & Padgett, 2011). Violent delinquency was used as a covariate, since conduct problem behaviour has been found to relate to emotional processing and may act as a suppressor variable in some cases of emotional expressions (Muñoz, 2009). Only males were included, since findings of emotional processing can be inconsistent across gender (Dadds et al., 2008). Finally, emotion recognition for body and facial expressions were also examined.

Further, dynamic emotional expressions were used. In real-life communications, emotional expressions rarely appear static. Recently, videos of real-life experiences are beginning to be used in research (Caes et al., 2012). Dynamic emotion expressions reflect different stages of emotional intensity,

specifically the course of emotional expression from neutral to high intensity (Simon et al., 2008). Motion of emotional expressions, in addition to shape information, presents a rich display of emotional state. In fact, Wehrle, Kaiser, Schmidt, and Scherer (2000) provide evidence that the addition of dynamic information improves emotional processing. However, it was expected that emotion recognition skills of dynamic distress signals would be impaired for adolescents high in callous-unemotional traits even with the added motion information. Specifically, it was hypothesised that adolescents with high levels of callous-unemotional traits would show difficulties accurately recognising fearful, sad and pain facial expressions, and fearful and sad bodily expressions.

2.2 **Method**

2.2.1 **Participants**

Boys attending alternative short stay schools in Lancashire were recruited for participation in this study. Such alternative schooling was provided for adolescents who were permanently or temporarily expelled from their main stream school because of continuous disruptive behaviour. Three schools were contacted about this study for the purpose of recruitment and all three agreed to take part. Head teachers of all three short stay schools gave their consent *in loco parentis* as target age range of adolescents was 11 to 16 years of age. In addition, and because most participants were still under the age of 16, information on the study was sent to the parents who then had a period of two weeks when they could opt out of the study. None of the parents objected, so each boy within the age range was approached individually by

school staff to ask for their assent. In total, 52 boys were asked to participate across the three schools and 50 boys (98%) between the age of 11 to 16 (mean age=14.3; SD=1.2) agreed to participate.

The majority of the final sample of 50 boys were of White British ethnicity (89.2%) followed by a smaller percentage of adolescents of Pakistani (5.4%), Indian (2.7%) and White Caribbean (2.7%) backgrounds. Further, the majority of participants reported that they grew up living with their biological father and mother (59.5%) followed by living with biological mother alone (24.3%). With regard to family size, 48.6% of the participants reported living with none, one or two siblings, and 51.2% reported living with three or more siblings.

2.2.2 **Measures**

Callous-Unemotional Traits

Callous-unemotional traits were assessed using two screening tools for use with adolescents. The Youth Psychopathic Traits Inventory (YPI) (Andershed, Kerr, et al., 2002) was developed as a measure for psychopathic traits for adolescents from the age of 12 years in the general population (Andershed, Hodgins, & Tengström, 2007). The YPI has been found to be uniquely different from other callous-unemotional assessments, such that items are worded as neutral or even as a beneficial trait (e.g. "I usually feel calm when other people are scared") instead of being worded as a deficit. This was intended to encourage adolescents to endorse the items. The YPI is divided into 10 subscales of five items each: interpersonal (lying, manipulation, grandiosity and dishonest charm); affective (callousness, unemotionality and remorselessness); and behavioural (impulsivity, thrill-seeking

and irresponsibility). According to confirmatory and exploratory factor analysis, the 50 items of the YPI load on three interrelated factors: 1) Grandiose/Manipulative, 2) Callous/Unemotional and 3) Impulsive/Irresponsible (Andershed et al., 2007; Andershed, Kerr, et al., 2002; Rennie & Dolan, 2010). Participants rated each item on a 4-point Likert-type scale ranging from "Does not apply very well" (1) to "Applies very well" (4). The sum of the final scores of the callous-unemotional subscale for each participant was used for data analysis. Total scores of the YPI callous-unemotional could range between 0 and 60 with a higher score reflecting greater levels of callous-unemotional traits. Internal consistency of the callous-unemotional subscale of the YPI was moderate with α=.60 and similar to prior research (Andershed, Kerr, et al., 2002).

Participants also completed the 24-item Inventory of Callous-Unemotional Traits (ICU) (Frick, 2004). The scale is rated on a four-point Likert scale indicating 0 'not at all true' to 3 'very true'. The ICU has been validated in adolescent community samples across different cultures (Essau, Sasagawa, & Frick, 2006; Fanti, Frick, & Georgiou, 2009; Roose, Bijttebier, Decoene, Claes, & Frick, 2010), and in juvenile offenders in the United States but eliminating items 2 and 10 (Kimonis, Frick, Skeem, et al., 2008). In all samples, a similar factor-structure emerged with three factors (e.g., Uncaring, Callousness, Unemotional) loading on a higher-order callous-unemotional dimension. Importantly, the total scores proved to be internally consistent in these samples (coefficient alpha .77 to .89) and they were related to antisocial behaviour, aggression, delinquency, various personality dimensions, and psychophysiological measures of emotional reactivity in ways consistent with past research on callous-unemotional traits. The items were summed, excluding items 2 and 10. Total scores on the ICU could range between 0 and 66

with higher scores reflecting greater levels of callous-unemotional traits.

Self-report of Violent Delinquency

Participants reported on their violent delinquency using eight items from the Self-Report of Delinquency Scale (SRD) (Elliott & Ageton, 1980). Participants were required to answer 'yes' (1) or 'no' (0) on whether they have engaged in violent behaviour against others (teachers, students or others) in the past (e.g. "Have you ever hit (or threatened to hit) a teacher or other adult at school?"). Specifically, items also asked about whether they were violent with the intent of harming others (e.g., "Have you ever attacked someone with the idea of seriously hurting or killing him or her?") or obtaining things (e.g., "Have you ever used force (strong-arm method) to get money or things from other students?"). The self-reported violence measure then presented one variable of violent delinquency by summing of violent acts committed with a possible range of zero to eight (Krueger et al., 1994). Items were developed based on all offenses reported by the Uniform Crime Report where juvenile offense rate was greater than 1% (Elliott & Huizinga, 1983). The violent subscale of the SRD (Elliott & Ageton, 1980) used in this study presented an adequate internal consistency of α=.56 similar to prior research (e.g., α=.61) (Kimonis, Frick, Skeem, et al., 2008).

Adolescent's Emotion Understanding

Emotion recognition skills were assessed from two sets of dynamic stimuli presenting facial expressions and postures of emotions. Emotional displays were presented randomly but maintaining the faces and postures separate. Participants responded to the emotional videos given a set of options of emotional labels. The

decision to use forced-choice response was consistent with prior emotion recognition research (Muñoz, 2009). Participants could respond at any point following the start of the video. Videos were presented using E-Prime 2. The presentation was programmed in a way so the display of the next emotional face or posture could only happen upon the participants' response. Response time data, therefore, was not limited. That is, participants could take as much time as they wanted to respond to the presentation of expressions. However, participants were asked to make an intuitive and relatively quick decision. Emotion recognition accuracies by emotion were collected.

A) Facial stimuli were presented to participants as a series of one-second dynamic visual stimuli of faces of four female and four male trained actors (Simon et al., 2008). Emotions displayed by these actors included fear, pain, anger, happiness, disgust, and sadness (see Appendix A for examples). The actors were instructed to imagine personal situations when they might have felt similar emotions; they were also shown images of prototypical facial emotional expressions to record the videos. The nature of a dynamic presentation of emotions has allowed the display of a course of an emotional expression starting with a neutral face and ending at the peak of the emotion expression. Expressions were prototypical because they were identified as possessing key features of Ekman and Friesen (1975) Facial Action Coding System (FACS). In the present study, a set of four videos for each emotion was presented with two female and two male actors each. Videos of emotional faces for each emotion were chosen with reference to how reliably these emotions were recognised according to intensity, valence and arousal and were further standardised within a pilot sample of young healthy adults (Simon et al., 2008). Previous research that involved healthy young adults has shown mean recognition rates of 85% and 86% of

the dynamic face expression demonstrating reliable and discriminative features (Collignon et al., 2008; Simon et al., 2008 respectively). For the present sample, an investigator error was encountered which resulted in the exclusion of the face recognition data of 13 participants.

B) Body poses were presented to participants in addition to facial expressions of emotions making use of a series of three-second video clips of emotions in patch-light condition (Atkinson, Dittrich, Gemmell, & Young, 2004). In this condition, main body parts (e.g., hands, face, knees) are represented by patches of light, which are the only visible elements in the video. When static, the seemingly unconnected dots appear meaningless; in motion, however, they give the viewer an impression of a moving body. Actors were instructed, similar to the development of the facial videos, in their performance to ensure interpretations of how to express one emotion, and for the purpose of the emotional poses to appear spontaneous. Although the patch-light expressions have not been used with adolescents, previous research has shown good discriminative features of these bodily emotion expressions and better accuracies than static full-light expressions with a sample of young adults (Atkinson et al., 2004). So, the use of patch-lights in motion was confirmed to be a valid display of dynamic emotional body poses. Patch-light video in contrast to full-light videos contains unconfounded motion information while excluding any static or form information (Johansson, 1973). Specifically, age information was not displayed, so that participants could not tell whether emotions were acted out by adults or same-aged peers. Emotional postures used were fear, anger, happiness, disgust, and sadness (see Appendix A for examples). Because the facial expressions and the set of postures were developed separately, only the facial set included painful expressions. Videos of emotional postures similar to the facial expressions were

chosen from this database with reference to how reliably these emotions were accurately recognised (>80%) (Atkinson et al., 2004). So that a set of four videos for each emotional posture was presented showing two female and two male actors. Finally, due to fatigue, three participants did not finish the posture recognition task, and were subsequently excluded from analyses of the emotional posture recognition accuracy.

2.2.3 **Procedure**

The study was carried out under the approval of the ethics committee of the University of Central Lancashire. No incentives were provided for taking part. Following the participants' verbal consent to take part, the adolescents were brought into a quiet room within the school to complete the YPI and ICU as well as the violent delinquency items. On completion of the questionnaires, the adolescents were asked to complete the emotion recognition task, which included a set of emotional facial and emotional posture expressions. Both sets were presented to the adolescents while counterbalancing for order.

2.2.4 **Data Analytic Strategy**

For the purpose of comparing present findings to that of prior investigations, unbiased participants' rate of correct responses that would take response bias into account was calculated by the following method. The squared correct response was taken and divided by the product of the response bias (i.e. emotion label) and the number of stimuli for each emotion in each set.

$$\text{biased corrected accuracy} = \frac{(\text{number of correct responses})^2}{(\text{number of emotion labels})*(\text{number of stimuli})}$$

Indeed, both YPI callous-unemotional and ICU were related to the more frequent use of the label of faces as angry, r=.49, p<.01 and r=.42, p<.01, respectively. The YPI callous-unemotional was negatively related to the use of disgust in labelling faces, r=-.39, p<.05. Additionally, corrected response to happy face recognition appeared skewed and would not converge with the model. For further analyses, only happy face recognition was normalised using a log transformation by taking the natural logarithm.

To determine if callous-unemotional traits were related to deficits in recognition of distressful emotional expressions (i.e., fear, pain, and possibly sadness), hierarchical multiple regressions were conducted using Mplus 7.11 (Muthen & Muthén, 1998). Fully saturated models with manifest variables were run separately for facial expressions and postures. The first model included two steps, regressing ICU and YPI callous-unemotional on age and violent delinquency, and then adding the accuracy for the six facial emotions[1]. Significant improvement of the model fit was examined to see if emotion recognition measures significantly predicted callous-unemotional traits after accounting for the covariates.

[1] In order to examine whether a covariance between ICU and YPI CU would explain the association between emotion recognition and CU traits, the two scales of CU traits were entered into one model (two models: one each for faces and postures). Results were not substantively different to entering YPI CU and ICU separately (that is, four models). Thus, for the sake of simplicity, the former model was used, which allowed for the covariance between ICU and YPI CU.

2.3 **Results**

Preliminary Analyses

Table 2.1 shows the descriptive statistics of the main study variables. Due to the skewness of happy facial expression accuracy, a log transformation was

Table 2.1 Descriptives of main study variables.

	N	*α*	M	SD	Min	Max	Skewness	Kurtosis
YPI CU	50	.60	36.54	6.05	26	51	.39	-.07
ICU	50	.75	25.86	7.80	6	42	-.07	-.13
SRD: Violent Delinquency	50	.56	2.94	1.33	0	6	-.32	.02
Accuracy: faces								
Angry	37	-	.59	.29	.05	1.00	-.20	-1.13
Fear	37	-	.62	.31	.06	1.00	-.16	-1.31
Sad	37	-	.73	.24	.13	1.00	-.74	.19
Pain	37	-	.57	.36	.00	1.00	-.10	-1.42
Disgust	37	-	.40	.27	.00	1.00	.38	-.34
Happy	37	-	.95	.13	.33	1.00	-3.32	12.49
Accuracy: postures								
Angry	47	-	.49	.27	.07	1.00	.14	-.88
Fear	47	-	.43	.25	.03	1.00	.13	-.50
Sad	47	-	.42	.23	.00	.86	-.08	-.67
Disgust	47	-	.32	.23	.00	.83	.94	.11
Happy	47	-	.63	.22	.10	1.00	-.36	-.10

conducted prior to further analyses. Zero-order correlations between the covariates and demographic measures showed that increasing age was related to less accuracy in recognising anger in faces, r=-.45, p<.01. Also, both YPI callous-unemotional and ICU were positively related to violent delinquency, r=.38, p<.01 and r=.31,

p<.05, respectively. Thus, age and violent delinquency were both used as covariates.

In addition, zero-order correlations amongst main variables, i.e. callous-unemotional traits as measured using the ICU and the YPI CU as well as bias-corrected accuracies for recognising emotional faces and poses, were carried out. Table 2.2 notes the results of the correlation analyses for emotional faces and callous-unemotional traits. Correlation coefficients revealed that good recognition skills of distressed emotional faces, e.g. pain, fear or sadness, were interrelated with each other. Specifically, greater accuracy recognising fearful expressions was significantly related to greater accuracy recognising sad (*r*=.36, p<.05), disgusted (*r*=.48, p<.01) and painful (*r*=.53, p<.01) expressions. Similar to fear, greater accuracy recognising painful expressions was also significantly related to greater accuracy recognising sad (*r*=.60, p<.001) and disgusted (*r*=.46, p<.01) facial expressions.

Table 2.2 Zero-Correlation Coefficients among Accuracies of Emotional Face Recognition, CU Traits and Violent Delinquency

	Delinquency	ICU	YPI CU	Happiness	Anger	Pain	Fear	Sadness	Disgust
CU Traits									
ICU	.314*	-	-						
YPI CU	.382**	.349*	-						
Faces									
Happiness	.109	-.020	-.129	-					
Anger	.189	.380*	.142	.315	-				
Pain	-.088	-.022	-.287	.040	.050	-			
Fear	.043	.011	-.119	.020	.102	.529**	-		
Sadness	-.112	-.103	-.267	.303	.085	.599**	.362*	-	
Disgust	.120	.263	.064	-.187	.041	.464**	.475**	.154	-

*<.05, **<.01

It seems that if youth were good at recognising one type of distress in other's faces,

e.g. fear and pain, they tended to be good in recognising other distress facial expressions, e.g. sadness and disgust. Also, only the ICU was positively related to accuracy in recognising angry faces, r=.38, p<.05. Finally, both measures of callous-unemotional traits, i.e. the ICU and YPI CU, were positively, but moderately, related to each other, r=.35, p<.05.

Further, table 2.3 notes the results of the correlation analyses for emotional poses and callous-unemotional traits. Correlation coefficients revealed that an accuracy in recognising happy moving body poses were significantly and positively related to accuracies recognising angry (r=56, p<.001), fearful (r=.44, p<.01) and sad (r=.43, p<.01) moving body poses. Similar to happiness, an accuracy recognising angry poses was also positively related to accuracies recognising fearful (r=.59, p<.001) and sad (r=.42, p<.01) poses. Also similar to facial emotion recognition, accuracies in recognising moving distress poses, e.g. fear, sadness and disgust, were interrelated. Finally, only the ICU was significantly and positively related to the recognition of disgust moving body poses, r=.34, p<.05.

Table 2.3 Zero-Correlation Coefficients among Accuracies of Emotional Pose Recognition, CU Traits and Violent Delinquency

	Delinquency	ICU	YPI CU	Happiness	Anger	Fear	Sadness	Disgust
Poses								
Happiness	-.026	.003	.116	-				
Anger	.019	.071	-.094	.562**	-			
Fear	.015	-.027	.056	.439**	.585**	-		
Sadness	-.153	-.165	-.013	.426**	.416**	.767**	-	
Disgust	-.030	.341*	.022	.141	.129	.343*	.319*	-

*<.05, **<.01

Do Adolescents with high Levels of Callous-Unemotional Traits show a Fear, Sad and Pain Recognition Impairment from Dynamic Emotional Facial Expression?

The first step of the regression resulted in significant prediction of the YPI CU, β=.38, SE=.12, *t*= 3.16, *p*<.01, 95%CI = .15 to .62, and the ICU, β=.34, SE=.13, *t*= 2.71, *p*<.01, 95%CI = .09 to .58, from violent delinquency. Further, YPI callous-unemotional and ICU were positively correlated in the model (see Figure 2.1), though the effect size was weak (*r*=.26, *p*<.05). The variance explained (R^2) was .15 for the YPI callous-unemotional and .12 for the ICU, which were both non-significant. The addition of the facial emotion recognition measures resulted in a significant improvement of the model fit, Δ-2LL (Δdf=12) = 91.16, *p*<.001. The standardised solution of the final model is summarised in Figure 2.1. This showed accuracy for pain negatively statistically predicted callous-unemotional traits (measured by YPI CU), β= -.41, SE=.23, *t*= -1.99, *p*<.05, 95%CI = -.81 to -.01. Additionally, examining the responses revealed that pain was most often misidentified as sadness and disgust. The resulting variance including all predictors and covariates was significant in explaining YPI callous-unemotional scores, R^2=.36, SE=.13, *t*= 2.87, *p*<.01. Unexpectedly, for ICU, only accuracy of angry faces was significantly and positively associated with callous-unemotional traits, β=.36, SE=.17, *t*= 2.18, *p*<.05, 95%CI = .04 to .69. This is similar to research on adult psychopathic criminals (Iria, Barbosa, & Paixao, 2008). The variance explained for

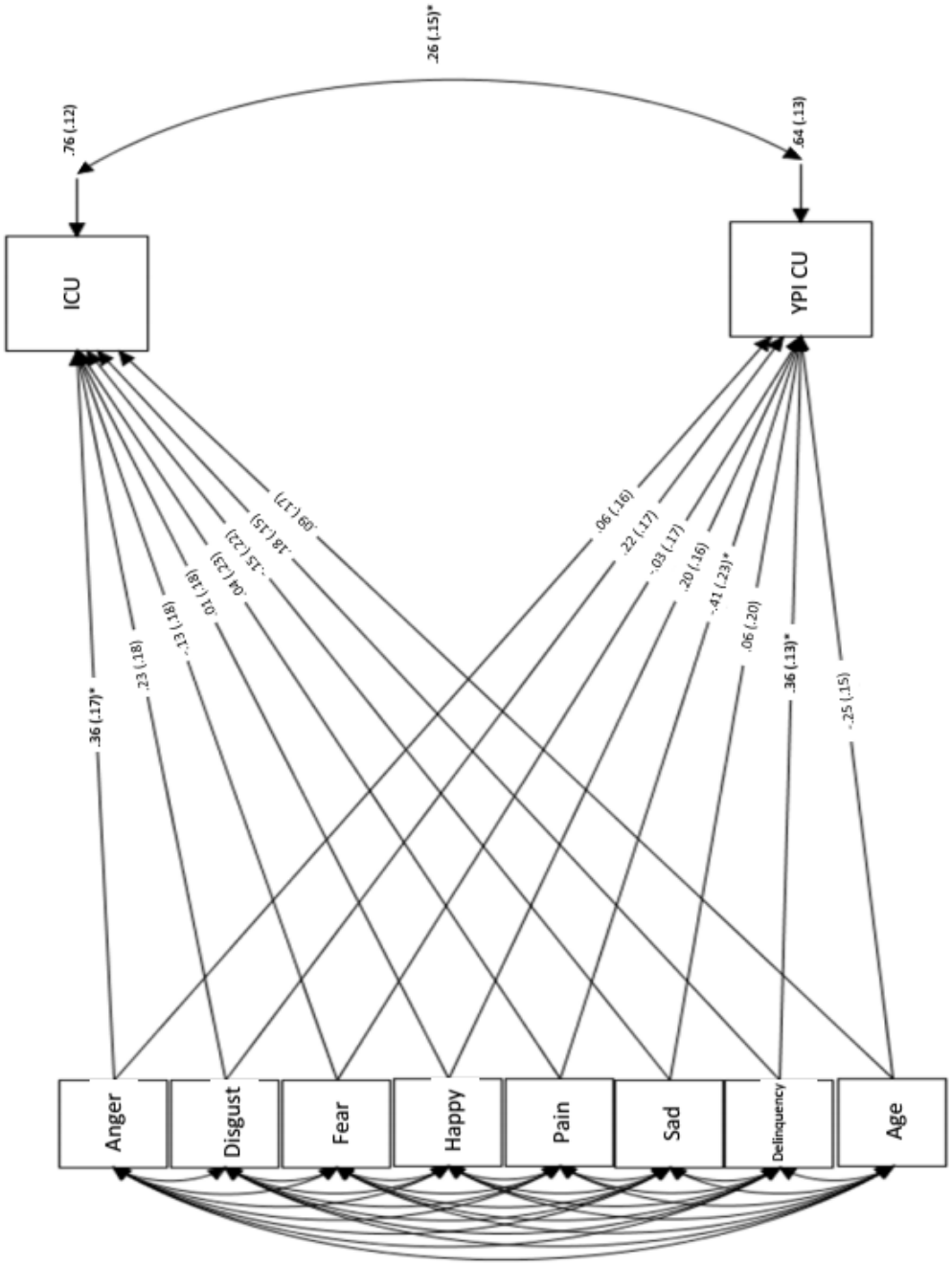

Figure 2.1 Standardised solution of betas (SE) in the model of callous-unemotional traits regressed on emotional faces (using the callous-unemotional subscale of the YPI and the ICU). Note: *p < .05.

the ICU was marginally significant, R^2=.24, SE=.12, *t*= 1.96, *p*=.05. Finally when including emotional faces in the model, violent delinquency was significantly associated with YPI callous-unemotional traits, β= .36, SE=.13, *t*= 2.66, *p*<.01, 95%CI = .09 to .62, but was no longer significantly associated with ICU scores, β= .18, SE=.15, *t*= 1.21, *p*=.23, 95%CI = -.11 to .48. Therefore, deficits in recognising painful facial expressions were related to the measure of callous-unemotional traits (measured by YPI CU), which was also uniquely related to violence. However, ICU scores were no longer significantly associated with violent delinquency after including emotional faces, possibly because of the strong association with accuracy in recognising anger.

Do Adolescents with high Levels of Callous-Unemotional Traits show a Fear, Sad and Pain Recognition Impairment from Dynamic Emotional Body Poses?

The second model examined callous-unemotional traits and accuracy for emotion recognition in postures. Further, callous-unemotional traits was regressed onto accuracy for all five emotional postures. The model fit improved significantly with the addition of the accuracy for emotional poses, Δ-2LL (Δdf=10) = 35.30, *p*<.001. The results of the final model (as standardised values) are summarised in Figure 2.2. Similar to prior research with the ICU (Muñoz, 2009) a significant and negative association between YPI callous-unemotional scores and angry posture recognition was found, β= -.41, SE=.17, *t*= -2.47, *p*<.05, 95%CI = -.73 to -.08. Examining the most frequent responses for anger revealed that it was most often misidentified as happy followed by disgust. Interestingly, accuracy for happy postures was significantly and positively associated with YPI callous-unemotional scores, β=.33, SE=.15, *t*= 2.21, *p*<.05, 95%CI = .04 to .63, even when accounting for

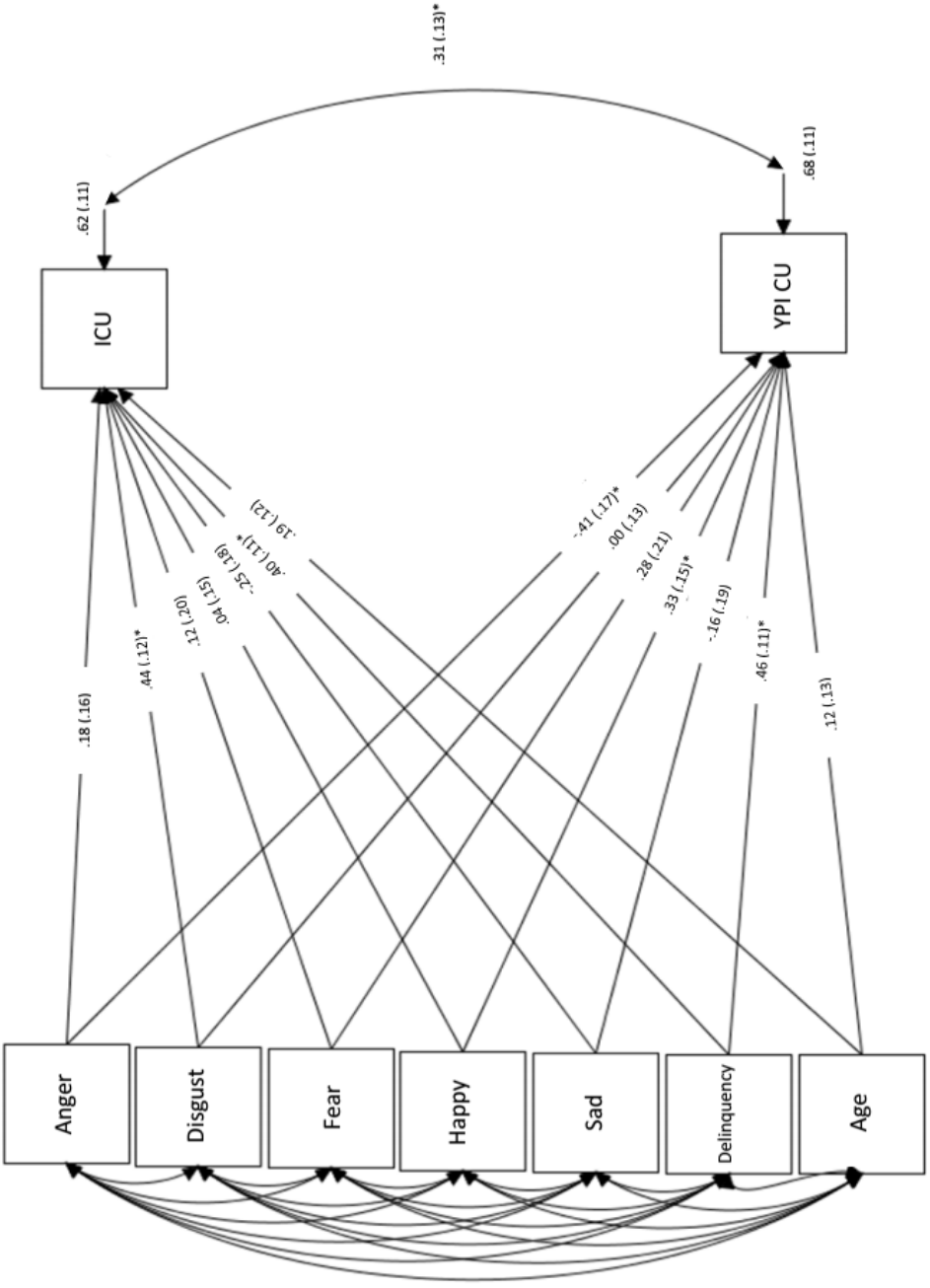

Figure 2.2 Standardised solution of betas (SE) in the model of callous-unemotional traits regressed on emotional poses (using the callous-unemotional subscale of the YPI and the ICU). Note: *p < .05.

response biases in labelling. The resulting variance explained in YPI scores for the final model was significant, R^2=.32, SE=.11, t= 2.82, p<.01. Unexpectedly, for ICU scores, accuracy for disgust was significantly and positively associated with callous-unemotional traits, β=.44, SE=.12, t= 3.70, p<.001, 95%CI = .21 to .67. The variance explained in the ICU scores was significant, R^2=.38, SE=.11, t= 3.41, p<.001. Further, delinquency was significantly associated with both YPI callous-unemotional scores, β=.46, SE=.11, t= 4.10, p<.001, 95%CI = .24 to .68, and ICU scores, β=.40, SE=.11, t= 3.59, p<.001, 95%CI = .18 to .62. Thus, for YPI CU, deficits were shown in recognising the negative emotion of anger in postures and pain in faces. However, ICU showed enhancements in recognising disgust in postures and anger in faces.

2.4 **Discussion**

The present study is the first known study to demonstrate behavioural deficits in relation to pain-recognition for adolescents high on callous-unemotional traits (measured with the YPI). Given the importance of distress cues for social interactions, the present study supports a model of impaired emotional processing of distress for adolescents high on callous-unemotional traits (Blair, 1995). The ICU showed relations with accuracy for recognising anger in faces. Indeed, in the hierarchical model, violent delinquency was no longer related to the ICU once recognition of anger was included in the model. Like research showing enhancements for anger-recognition in criminal populations and in criminal people with psychopathy (Iria et al., 2008), callous-unemotional traits (using the ICU) in the

present sample of excluded young males may be related to violent delinquency due to the enhanced ability to recognise anger.

Present findings showed a specific deficit for facial expressions of pain in boys with higher levels of callous-unemotional traits. Generally, facial emotion expressions are considered the first communication margin that, when accurately processed, can lead to an empathic response (Niedenthal & Brauer, 2012). Importantly, the processing of emotion expressions is thought to be complemented by a vicarious emotional experience as a supportive mechanism of the observations (Olsson & Phelps, 2004). Recent research has confirmed a low empathic response to seeing others' pain for people with callous-unemotional features (Lockwood et al., 2013; Marsh et al., 2013). Further, prior research shows reduced anticipation of and reactivity to pain stimuli in people with high callous-unemotional traits (measured as psychopathy) (Caes et al., 2012; Hare, 1965). In other words, people high on callous-unemotional traits may not understand the pain experiences of other people (Blair, 1995) because of a lack of vicarious emotional experience (Yamada & Decety, 2009). Indeed, Caes et al. (2012) showed that psychopathy was related to less sensitivity in detecting another person's pain. This suggestion is also supported by neuroimaging research. Such research has identified a reduced activation of neural structures involved in processing and vicariously experiencing other people's pain for those with high callous-unemotional traits (Marsh et al., 2013); these same structures, such as the anterior cingulate cortex and insula (Botvinick et al., 2005) as well as the amygdala and ventromedial prefrontal cortex for processing of male faces (Simon, Craig, Miltner, & Rainville, 2006), have been found to be involved in the first-hand experience of pain (Jackson et al., 2005; Lamm, Meltzoff, & Decety, 2009). Indeed, very recent research suggested that while psychopathic individuals

showed normal activation of these brain regions when they imagined pain to themselves, these regions showed a reduced activation when they imagined pain to others (Decety et al., 2013). Therefore, adolescents high on callous-unemotional traits may show difficulties processing painful facial expressions due to their own low empathic response to other's pain (Lockwood et al., 2013).

Our results may be interpreted as supporting the Violence Inhibition Mechanism (VIM) (Blair, 1995). Although pain has not been considered in this context, painful facial expressions may serve a similar function as aversive stimuli (such as fear) and consequently regulate or inhibit behaviour. The function of distressful emotional expressions may then act as *behaviour regulators* (Campos et al., 2003). Therefore, difficulties processing painful facial expressions in boys high on callous-unemotional traits may be evidence of a failing behaviour regulator. Prior research on interpersonal violence among adult couples has shown that violent husbands misperceive fear in their wives: often, fear was misidentified as disgust. If fearful emotional expressions are misperceived as expressions of disgust, then emotions that typically act as inhibitors to violence may be construed as a social rejection (Marshall & Holtzworth-Munroe, 2010). In the present study, pain was often misidentified as disgust. Thus, adolescents high on callous-unemotional traits may perceive rejection when others are actually in pain, which may account for their aggressive and bullying behaviour (Muñoz et al., 2011). However, because the fear processing deficit that has been found in prior research could not be replicated, this remains a suggestion to test in the future.

Further, the central finding of the present study was two-fold. Firstly, general distress-processing deficits may be implicated in a callous-unemotional specific trajectory of antisocial and aggressive behaviour. That is, research exists showing

that adolescents with callous-unemotional traits experience deficits in general emotional processing of distress cues, such as scenes of sadness, fear, and pain (Kimonis et al., 2007). The results of the present study were consistent with expectations that distress emotions (e.g., pain) would be associated with callous-unemotional traits. Secondly and in contrast to previous expectations, the specific distress emotion (i.e., fear) that has been consistently found to be related to callous-unemotional traits in prior research (Marsh et al., 2010) was not found. Some research has failed to show a deficit in fear recognition for adolescents high on callous-unemotional traits using facial expressions (Glass & Newman, 2006; Kosson et al., 2002; Woodworth & Waschbusch, 2008). Inconsistencies between the present findings and those of prior research may be because of differences between samples. Similar to another study (Woodworth & Waschbusch, 2008) that did not find a fear deficit, an adolescent sample who were referred for antisocial behaviour to an alternative school was recruited (Woodworth & Waschbusch, 2008, used a treatment program). Research that has found a fear and sad deficit (Muñoz, 2009) used a community sample from deprived backgrounds, but were not referred for antisocial behaviour. Because the present sample showed high levels of violence, the null findings here may have reflected a comorbidity problem that was not accounted for. Specifically in previous research, problem behaviour was found to highly overlap with impulsivity problems (Malti et al., 2015). Furthermore, adolescents with problems of impulse control have demonstrated a greater sensitivity and faster reactivity to negative emotional stimuli than adolescents with CU tendencies (Loney et al., 2003). Given that impulsivity problems were not controlled for in the present study, failure to replicate a fear or sad deficit may reflect that a high proportion of adolescents in the sample had impulse control problems. Indeed, Woodworth and

Waschbusch (2008) previously found that adolescents with high levels of callous-unemotional traits had difficulties recognising sad faces and a trend for fear faces after controlling for impulsivity problems (e.g. Attention Deficit Hyperactivity Disorder). This suggests future research should include a measure of impulse control.

Additionally, facial expressions of pain may be more arousing and possess a greater threat value than fear, and attention to such painful stimuli may be more dependent on a vicarious emotional experience as part of an evolutionary and biological protective system (Craig, 2009). More specifically, pain is perceived as most threatening or arousing indicating a more imminent threat. Further, pain is described as an emotion distinct from other basic emotions such as anger, fear, sadness, and happiness (Simon et al., 2008). Thus, discrepancies in findings across studies require further investigation. Future research would benefit from the use of physiological measures to examine the potential vicarious experience that accompanies emotional processing. For example, recent research finds callous-unemotional traits (measured by the ICU) are related to less fear sensitivity (Roose, Bijttebier, Van der Oord, Claes, & Lilienfeld, 2013); thus, it could be callous-unemotional traits are related to reduced levels of physiological arousal when viewing others in pain (Caes et al., 2012; Lockwood et al., 2013).

In contrast to prior research that involved a similar sample of antisocial adolescents (Muñoz, 2009), callous-unemotional traits (measured with the ICU) were related to better recognition of anger and disgust in the present study. However, the present findings are consistent with other research on adults with psychopathy, where they showed high false alarm rates to angry faces (Iria et al., 2008; Marshall & Holtzworth-Munroe, 2010). Indeed, the present findings showed greater use of the

anger label for those with callous-unemotional traits. Although accuracy measures in the present research were corrected by taking labelling bias into account, it could be this bias still had an effect. In studies of adult psychopathy, a good ability to detect disgust and anger was related to violence (Blair et al., 2001; Iria et al., 2008; Marshall & Holtzworth-Munroe, 2010). The current findings also indicated that violence was no longer significantly related to callous-unemotional traits once emotion recognition measures, including anger, were included in the model. This suggests enhancement of anger identification in young males with callous-unemotional traits may account for their violent behaviour. Consistent with these findings, callous-unemotional traits (ICU) in adolescents have been associated with violence and aggression in numerous studies (Munoz & Frick, 2012, for a review). Another surprising finding in our study was a positive relation between the YPI callous-unemotional subscale and recognition of happy postures. In contrast, the same YPI subscale was related to a reduced ability to recognise angry postures: these were most often labelled as happy. Anger and happiness displayed in the dynamic bodily expressions were the most kinetic of movements. It could be that adolescents high on callous-unemotional traits (YPI) misperceive subtle differences between emotions when information about form and shape are not able to be used.

In real-life communications, facial expressions are typically accompanied by gestures such as hand, upper body or head movements, which allow for further contextual information to be processed by the viewer. Although having this contextual information may assist in processing emotional expressions (Wehrle et al., 2000), prior research has found adolescents high on callous-unemotional traits experience deficits in processing fearful bodily expressions (Muñoz, 2009). This may suggest an emotion processing deficit that is not isolated to the recognition of

emotional faces, and which may have implications for behavioural outcomes (Blair, 1995). Atkinson and colleagues (Atkinson et al., 2004; Atkinson, Heberlein, & Adolphs, 2007) have found that patch-light, in contrast to full-light whole body emotional expressions, were generally less accurately identified, providing greater variance in recognition. The intention of using only motion information of emotions was to amplify any specific emotion-processing deficit in relation to callous-unemotional traits. However, the patch-light task was very difficult as evidenced by the means; this may have contributed to the differences between our findings and those of other studies that have used static faces or postures (Dadds et al., 2006; Muñoz, 2009).

Also contrasting findings between both callous-unemotional traits measures, i.e. positive associations between callous-unemotional traits (ICU) and accuracy in recognising angry facial and disgusted bodily expressions in contrast to negative associations between callous-unemotional traits (YPI CU) and accuracy in recognising painful facial and angry bodily expressions, were somewhat unexpected. However, such contrasting findings may be explained by a moderate correlation between both callous-unemotional traits measures. Whereas both measures obtained an expected association with greater involvement in violent delinquency in the present study, and are considered a valid assessment tool of callous-unemotional traits, the two measures correlated specifically low once violent delinquency was controlled for. The present research was the first to include both the ICU and YPI callous-unemotional subscale, but seems consistent with a previous study that looked at associations between the APSD and the YPI (Poythress, Dembo, Wareham, & Greenbaum, 2006). Poythress and colleagues found a comparably low correlation between the callous-unemotional subscales of both measures.

Further, such low correlations may be founded in that the callous-unemotional traits measures were developed with different research contexts in mind. That is, the ICU was developed to provide a more comprehensive assessment of callous-unemotional traits. It was intended to overcome the psychometric limitations of the 6-item callous-unemotional subscale of the Antisocial Processing Screening Device (APSD; Frick & Hare, 2001), which mapped onto many of the dimensions of the Psychopathy-Checklist (Poythress et al., 2006). The Psychopathy-Checklist in turn is limited to use in a clinical setting. In contrast, the YPI was developed to overcome limitations of more clinically orientated callous-unemotional traits measures such as the APSD, and was specifically intended for the use as a self-report version within adolescent community samples (Andershed, Kerr, et al., 2002). Therefore, the YPI was developed to account for a lack of insight often associated with callous-unemotional traits, and aimed to tap into these traits indirectly. For this purpose, items were worded in a way that these traits were seen as positive and admirable by people with high callous-unemotional traits (e.g. "I usually feel calm when other people feel scared"). The present contrasting findings and low correlation between the ICU and the YPI callous-unemotional subscale may therefore highlight the discrepancies and lack of convergent validity between these measures. Inconsistent findings amongst emotional correlates for callous-unemotional traits across the body of research may also be a reflection of the use of different assessment tools for callous-unemotional traits specifically within different samples. More research is needed to understand the relations between the callous-unemotional traits measures in current and frequent use with a specific focus on their use in different kinds of samples, e.g. community or referred samples.

The findings from the present study must be interpreted in light of some

limitations. Following the presentation of each dynamic facial expression video, the expressions froze. For example, participants could take as much time as they wanted to press any of the keys labelling the displayed expression while the frozen picture was there. Therefore, the findings of the present study reflect emotion recognition not solely for dynamic expressions, but participants could have made use of the final static expressions to aid them. Additionally, the small sample size may have limited the statistical power to find significant effects for fear. Also for face recognition, the data of 13 participants were unavailable for data analyses reducing the sample size for face recognition even further. However, consistent with prior research, find significant deficits for pain and anger were indeed found. Finally, dynamic facial, as well as patch-light body expressions, have not been validated with adolescents prior to the present study. Specifically, emotional faces were acted out by adults for the present study. However, prior research involving a similarly-aged sample (Muñoz, 2009) has found deficits in fear for adolescents high on callous-unemotional traits using static pictures of adult faces. This suggests that adolescents high on callous-unemotional traits may show deficits in recognising distress emotions in adult faces. The use of dynamic faces and postures was an improvement because only static pictures of adult faces and postures have been used with adolescents (Muñoz, 2009).

Future research should include measures of anxiety which were not included in the present study. Prior research has shown deficits in emotional processing of distress cues in adolescents with high levels of violence, community violence exposure and callous-unemotional traits (Kimonis et al., 2007), which is specific to a high-anxiety variant of callous-unemotional traits (Kimonis, Frick, Cauffman, Goldweber, & Skeem, 2012).

The present study also had some important strengths. First, the use of

dynamic emotional expressions is more ecologically valid than the use of static pictures, which have been traditionally been used in prior research. The present study also included another facial expression (i.e., pain) that may show behavioural deficits. Further, two measures of callous-unemotional traits were included to examine the generalisation of results across different screening tools. The present findings indicate the YPI callous-unemotional exhibited expected relations with emotional processing. Finally, these results suggest dynamic faces and postures show similarities with prior research. The present results also add to the understanding of deficits in understanding distress cues as key to the callous-unemotional personality type.

Therefore, the present findings could inform implications for treatment or early intervention for children with high callous-unemotional traits that centres around improving emotion recognition skills. In other words, training on perception and interpretation of human emotions may foster empathy skills. Indeed, when compared to treatment-as-usual, training on perception and interpretation of human emotions resulted in improvements in parent-reported affective empathy for children with callous-unemotional traits (Dadds, Cauchi, Wimalaweera, Hawes, & Brennan, 2012). Other alternative treatment for juvenile offenders aims to improve understanding of social and emotional interpersonal cues and consideration for others (Caldwell, Skeem, Salekin, & Van Rybroek, 2006; Malti & Keller, 2009; Obsuth, Eisner, Malti, & Ribeaud, 2015). Such treatment was found to reduce interpersonal callousness and predicted improved institutional behaviour and motivation to take part in the treatment over time (Malti & Keller, 2009; Obsuth et al., 2015). Further, the present findings suggest that such training, which focuses on empathy skills and consideration for others by improving emotion recognition, may

be warranted. Finally, present findings point towards a general deficit in interpreting negative emotions rather than a specific fear or sad deficit that may underlie the antisocial behaviour of adolescents high on callous-unemotional traits.

2.5 **Summary**

In sum, the aim of the present study was to broaden the scope of impairment for adolescents high on callous-unemotional traits to include other signals of distress besides sadness and fear, such as facial expressions of pain. The present findings did not replicate a specific deficit to fearful faces or body expressions. Instead, the findings point to a broad impairment for processing negative emotions in adolescents high in callous-unemotional traits. Specifically, problems recognising pain faces and angry body expressions were negatively associated with callous-unemotional traits in a group of antisocial boys who were 11 to 16 years old. Therefore, the present research supports a general empathy impairment to other's distress signals in adolescents high on callous-unemotional traits, which may underlie the violent behaviour that is associated with callous-unemotional traits.

CHAPTER THREE - DO PARENTS' MENTAL STATE TALK AND MUTUAL EYE GAZE ACT AS MEDIATORS BETWEEN PARENTS' AND CHILDREN'S EMOTION UNDERSTANDING?

3 Abstract

When children start to understand their emotional environment, typically, parents scaffold this development. Parental ability to scaffold is dependent on the parents' own emotion understanding skills. The current study explores this idea by examining mutual parent-child eye gaze (Dadds, Allen, et al., 2012) as well as parent's use of mental state references while watching the Happé-Frith Triangle Animations (Abell, Happe, & Frith, 2000) together with their child as a means to scaffold their children's emotional understanding. Furthermore, this study tested whether parents' scaffolding operates as a mediator between the emotional understanding in parents and their children. For this purpose, 57 parents and child dyads were recruited to take part in a session which included the Affective Knowledge Test (AKT; Denham, 1986) to assess the child's emotion understanding skills by using puppets and situation-elicited emotion expressions. Further, parents' emotion understanding was tested using a forced-choice emotion recognition task with 6 basic static facial emotion expressions. Findings support that parents' scaffolding of their children's emotional understanding is dependent on the parents' own level of emotional understanding. However, there was no significant direct association between parents' mental state talk or mutual eye gaze with children's emotional understanding. Results and implications are discussed in the light of previous research.

3.1 **Introduction**

Children start to develop their ability to understand emotions from as early as infancy which continues into childhood. Development of emotion understanding is not an individual or independent effort, but a collaborative effort through social interactions, and thereby is hypothesised to be dependent on the advanced levels of experience and emotion understanding of others (Castro et al., 2015). Indeed, it is the child's family who frames this learning process through interactions with the child (Dunn & Brown, 1994; Reissland, 2013). Similarly to the concept of scaffolding proposed by Vygotsky (1978) in relation to cognition, parents' experience and knowledge typically forms the foundation of a scaffolding process that underlies the necessary social structure and feedback helping their child to learn to interpret and express emotions appropriately (Denham & Kochanoff, 2002; Shai & Belsky, 2011; Taumoepeau & Ruffman, 2006, 2008). From as early as birth, infants have been found to observe and respond to their parents' and peers' emotion expressions through emotion imitation and emotion contagion (Kochanska & Aksan, 2006; Rozeboom, 1965; Zahn-Waxler & Radke-Yarrow, 1990). By preschool age, children learned to recognise, name and communicate most basic emotions and emotion-eliciting situations (Denham, 2007). Parents have a unique opportunity here to create a suitable emotional environment that supports their children's development of emotional understanding.

Specifically, parents scaffold their child's apprenticeship into the world of emotional and social interactions by permitting the child to understand situations which are beyond his/her current abilities such as reading emotions and intentions in others (Brownell, Svetlova, Anderson, Nichols, & Drummond, 2013; Hammond & Carpendale, 2015; Hammond et al., 2012). Methods of scaffolding the child's

emotion understanding include actively engaging the child's attention to - and interest in - others' emotional states, needs or wants by talking about mental states (Hammond et al., 2012; Harris et al., 2005; Svetlova et al., 2010). In addition, mutual eye gaze engages the child in face-to-face communication (MacLean et al., 2014). Of note, parents can encourage such an emotional communication with their child by creating a positive and warm emotional context which is accepting of the child's emotions (Isley, O'Neil, Clatfelter, & Parke, 1999; Shai & Belsky, 2011) and in which the child accepts the parents' guidance (Davidov & Grusec, 2006).

Parental Mental State Talk and Child Emotional Understanding Skills

Giving parents and their children the opportunity to exchange thoughts about their own and other's emotions could help the child to reflect on his or her own and other's minds and intentions (Denham & Kochanoff, 2002; Drummond, Paul, Waugh, Hammond, & Brownell, 2014; Salmon, Dadds, Allen, & Hawes, 2009; Taumoepeau & Ruffman, 2016). In this way, children come to understand the underlying intentions and motivation for their own and other's actions; they learn to understand their own and other's emotional states, and how people express their emotional states through parents modelling how one talks about them (Centifanti, Meins, & Fernyhough, 2016; Shai & Belsky, 2011; Taumoepeau & Ruffman, 2006). Also, spending time with parents who talk about the children's mental state exposes children to the concept of mental states. This may help the children to label their own emotional experience and to internalise an understanding of emotion expressions and emotional experience in themselves and in others (Castro et al., 2015; Dunn, Brown, & Beardsall, 1991; Taumoepeau & Ruffman, 2016). Such an internalisation is considered a stepping stone to their emotion understanding.

Previous research has shown that parents' use of mental state terms shift from talking about the child's own desires to references about other's emotion states and thoughts (Taumoepeau & Ruffman, 2006, 2008) which coincides with two to three year old children reaching an understanding that others can feel differently to themselves (Svetlova et al., 2010; Zahn-Waxler & Radke-Yarrow, 1990). This shift toward talking about other's internal states is an important step helped by reading stories with their child providing a rich context for discussing emotion states of the story characters, and is associated with the child's attainment of early perspective-taking (Drummond et al., 2014; Slaughter, Peterson, & Mackintosh, 2007; Symons, 2004). Additionally, joint book reading offers a unique shared time between parents and children with an opportunity for parents to talk about and elaborate on how characters in a book may think or feel. In this way, the child's own use of mental state references increases (Taumoepeau & Ruffman, 2006), so that joint book reading can also become an opportunity for children to ask and answer questions about the feelings and thoughts of the characters (Laible & Song, 2006; Symons, 2004). So, parents' comments about other's mental states in this context can enable the child to take note of and with the parents reflect on other's perspectives and how others may feel in various situations which may be different to how the child would feel.

Parent-Child Eye Gaze and Child Emotion Understanding Skills

In addition to verbal emotional communication, non-verbal face-to face interaction, including mutual eye gaze, may play an important role in the socialisation and communication of emotions between parents and child (Tomasello, 1995). From early on, children are sensitive to parental gaze direction and prefer the

parents' direct eye gaze (Augusti, Melinder, & Gredebäck, 2010; Farroni et al., 2007; Tomasello, Hare, Lehmann, & Call, 2007). Often, it is the parents' direct gaze that cues the child's attention and engages both parents and child in face-to-face interaction (Farroni et al., 2003; Farroni et al., 2007). Since paying attention to the face of another person is essential in emotion understanding, specifically paying attention to the eye regions for the recognition of others' distress (Adolphs, 2008; Gamer & Büchel, 2009; Skuse, 2003), the child's and parents' engagement in face-to-face interaction is the basis for processing the other's facial expressions and to know how the other person is feeling (Farroni et al., 2007). Indeed, parents of blind children cannot engage in eye contact with their child. Parents of blind children reported that they miss the facial feedback cues from their child which could help them to read and respond to their children appropriately (Fraiberg, 1974; Goldberg, 1977). Thus through parents' cues of direct gaze, they typically enable a shift of their child's attention to look at the parents' faces to read emotional expressions (Farroni et al., 2003) and to be able to monitor them (Tomasello, 1995; Tomasello, Carpenter, Call, Behne, & Moll, 2005).

Parents actively seek their child's attention to communicate their emotions and intent by engaging them in face-to-face interaction (Charman et al., 2000; Dadds et al., 2011). In turn, the child follows the direction of the parents' gaze to determine the target of their parents' attention. This helps the child use eye-gaze as a form of social referencing to determine the parents' feelings about the target, such as object, situation or person (Augusti et al., 2010; Hirshberg & Svejda, 1990). This mutual attention to each other's eyes is also related to increased displays of affection by parents towards their children (Dadds et al., 2014; MacLean et al., 2014). Hence, mutual gaze contributes to warm parent-child interaction.

Parental warmth may be a way for parents to prolong face-to-face interactions with their child, since spending time with parents becomes a genuine pleasure for children (Kochanska, 1993; Kochanska et al., 2008; Tronick, 1989). Therefore, the positive emotional climate parents create is a climate in which the child feels emotionally secure and wants to engage with their parents. In this way, parents can be a great influence when guiding their children how to interpret and respond to their emotional environment (Hirshberg & Svejda, 1990). In contrast, increased use of negative emotions and dismissive responding by the parents in their interaction with their children has the opposite effect and can result in more negative emotional responses by their offspring (Morris, Silk, Steinberg, Myers, & Robinson, 2007). Parents' negative emotionality may inadvertently teach the child to avoid emotional engagement with their parents and may arouse feelings of guilt. Instead, a predominantly warm and positive parenting style, which reflects the parents' fondness of their child and enjoyment to be with him/her, may encourage the child to engage with their parents on an emotional level (Hastings, Utendale, & Sullivan, 2007). The extent to which parents and children engage in mutual eye gaze with each other may be greater in the context of *parental warmth* (Dadds, Allen, et al., 2012).

Parental warmth has been defined variously as parental expression of affection and love (Davidov & Grusec, 2006) and positive emotions (Dunn & Brown, 1994), parental sensitive responsiveness (Isley et al., 1999; Kochanska et al., 2008), acceptance of their children's emotions (Lansford et al., 2014; Waller et al., 2013), and supportive parenting style (Malti, Eisenberg, Kim, & Buchmann, 2013). Since the present study was interested in examining parents' expression of fondness for their child, parental warmth was defined as parents' verbal or physical expression of affection. Parental warmth defined as such was found to be important for parents

scaffolding their children's development of emotion understanding (Davidov & Grusec, 2006).

The Role of Parental Emotion Understanding Skills

Further, as children look for a point of reference in their emotional environment in order to understand and respond to it (Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997), they listen and look to their parents. Children listen to how parents talk about emotions and evaluate how they react to other's emotion states. Some argue that through observation and imitation, children internalise parental understanding of emotions and intentions (Hammond & Carpendale, 2015). Previous research involving parents' mental state talk confirmed that it is their references to others' minds rather than parents' own emotion understanding which directly contributes to the children's emotion understanding (Taumoepeau & Ruffman, 2006, 2008). However, merely talking about mental states without considering the appropriateness meaning the accuracy of the mind-related comments may not have the positive effect on the child's development of emotion understanding (Denham & Kochanoff, 2002; Denham, 2007; Denham, Bassett, & Wyatt, 2007) and concern and care for others (Brownell et al., 2013). For instance in line with the concept of maternal mind mindedness, which is the mother's propensity to comment on and treat her child as an individual with his/her own mind, it is the appropriateness of the mother's mind-related comments made about her child that contribute to the mother's mind mindedness and her sensitivity towards her child's mental states (Meins, Fernyhough, Fradley, & Tuckey, 2001). In the case of parents using mental state talk with their child, this suggests that parents' own understanding of other's mental and emotion states contribute to the parents' abilities to accurately

talk about others' mental states (Castro et al., 2015), and is necessary for successful scaffolding of children's development of emotion understanding.

The Present Study

In sum, the aims of the present study were two-fold. First, the present study aimed to test whether emotion understanding of 3-5 year old children is dependent on parental mental state talk and parent-child mutual eye gaze when parents express their affection towards the child. Second, the intention here was to test whether children's emotion understanding is related to parents' level of understanding, mediated by mental state talk and parent-child mutual eye gaze.

To answer these questions, parents of 3-5 year old children were recruited through their school, nursery or *SureStart* children centres. Children between the ages of 3-5 years were chosen, because they have learned to understand that others' can feel differently to themselves (Svetlova et al., 2010; Zahn-Waxler & Radke-Yarrow, 1990) and are able to talk about emotions (Denham et al., 2007). This is important for assessing children's emotional understanding in the present study because the Affective Knowledge Test (AKT; Denham, 1986) relies partly on the child's verbalisation of emotions and linguistic skills (Denham, 1986; Denham, 2007). The AKT is designed for children aged 2 to 5 years - the age before they transition into school (Denham, 2006) - and involves a puppet play in which the children identify the emotion states of a puppet which may be similar or different to the way the children typically respond. Furthermore, parental emotion understanding skills using an emotion labelling task with static facial emotion expressions were assessed. Additionally, parents' talk was recorded while they watched the Happé-Frith Triangle Animations (Abell et al., 2000) with their child. These are short

animations of two triangles which were divided into two categories of a) triangles moving around randomly or b) apparent intention of one triangle to manipulate the movement of the other triangle. The parents' descriptions of the triangles' movements were coded for the extent parents used mental state attributions to explain the triangles' movements and the appropriateness of these attributions (Castelli, Happé, Frith, & Frith, 2000). Mental state attributions and appropriateness of these attributions as indices of parents' mental state talk were recorded. Also, parent-child mutual eye gaze in the context of parental warmth by coding the child and parents' gaze direction and the parents' expressions of physical and verbal affection towards their child was examined. For the purpose of assessing gaze direction and parental warmth, the I-Love-You task was administered (Dadds et al., 2014; Dadds, Allen, et al., 2012).

The following hypotheses were tested: first, the more parents talk about mental states during a shared time of story-telling (while watching the Happé-Frith triangle animations) the greater emotion understanding exhibited by parents and child (Taumoepeau & Ruffman, 2006, 2008). Second, child's and parents' emotion understanding will be related to increased gaze direction towards each other's eyes during expressions of parental warmth (Dadds et al., 2011). Third, parents' use of mental state talk acts as a mediator between parent's level of emotional understanding skills and children's better emotional understanding. Fourth, parent-child mutual eye gaze mediates the link between parents' and child's emotion understanding skills.

3.2 **Method**

3.2.1 **Participants**

Parent and child dyads (N=57, 52 mothers, 2 fathers, 1 adoptive mother, 1 step mother, 2 grandmothers) were recruited from the North East of England. All participants will be referred to as *caregivers* and their child. The children were aged between 36 and 68 months (M=48.66, SD=8.67) and caregivers ranged in age between 21 and 58 years (M=34.68, SD=6.90). Further demographic information about the present sample can be found in Table 3.1.

Table 3.1 Detailed demographic information about the sample.

	All participants(N=57 dyads)
Child Sex:	
Male	53.4%
Female	46.6%
Ethnicity:	
White-British	98.2%
Pakistani	1.8%
Child living with:	
Biol. Mother & Father	79.3%
Biol. Mother Alone	10.3%
Biol. Father & Step Mother	5.2%
Others (e.g. Grandparents)	3.4%
Biol. Mother & Step Father	1.7%
No. of Siblings:	
None	16.1%
1-2	78.6%
≥ 3	5.4%

Thirteen primary schools, nurseries and *SureStart* centres helped in contacting the caregivers, and 87% percent of the caregivers who expressed interest in the study (about one-fifth) took part. The location of the research session depended on the caregivers' availability and preferences to meet as well as whether the school or nursery was able to offer the space needed.

The present study received ethical approval from the Psychology Department of Durham University (Ethical approval reference number: 12/21). Compensation for the caregiver's time was offered in the form of £10 Amazon voucher and children received a sticker. Due to fatigue, two children did not complete all of the tasks and were excluded from further analyses.

3.2.2 **Materials**

Children's Receptive Verbal Ability

The British Picture Vocabulary Scale 3rd Edition (BPVS-III; Dunn, Dunn, Sewell, & Styles, 2009) was used to measure children's receptive verbal ability. This scale has been designed to be used for children ranging between 3 and 16 years of age. Children's receptive vocabulary was assessed individually by asking the child to point to one of four options of pictures that best represented the word the researcher said aloud. The BPVS-III comes with norm-referenced scores. Prior research has found that BPVS scores are related to emotion understanding (Cutting & Dunn, 2003). Specifically, results indicated that receptive vocabulary was found to be associated positively with affective labelling and perspective-taking as measured by the AKT (Denham, 1986). Therefore, the BPVS standardised scores in the present study were used as a covariate.

Children's Emotion Understanding

Children's emotion understanding was tested with the Affective Knowledge Test (AKT; Denham, 1986). The task involves puppets with detachable faces that showed one of four basic emotions: happiness, sadness, anger and fear (see Appendix A). The task contains two parts: children's affective labelling and affective perspective-taking skills.

Affective Labelling - Expressive emotion understanding was tested by asking children to label the four detachable emotional faces verbally without being given any further non-verbal/affective cues by the researcher. Receptive emotion understanding was tested by presenting children with four faces and asking them to point to the appropriate emotion when hearing a label. The order of the faces on both occasions was random.

Following the labelling portion of the AKT, the child was taught by the experimenter the correct emotion for each face. The experimenter demonstrated each emotion with non-verbal cues (facial and vocal expressions) and name the emotion associated with each emotional face.

Affective Situation Knowledge – Next, children's emotion understanding embedded in a situational context was assessed. For this purpose, the experimenter acted out 20 emotional vignettes with the puppets (see Appendix A for the scripts). Following the scenario, the children were asked to name the emotion the puppet felt, and were asked to choose one of the detachable faces to attach to the puppet's face which matched the emotion in context. Eight of the vignettes depicted typical emotion responses most people would show in the situation (e.g. FEAR: "Ooh, I am dreaming"," There is a tiger chasing after me!! OH NO!!"). For the remaining 12

vignettes, the puppets responded oppositely to how the child would usually respond in the situation. The child's opposite emotional response was determined prior to this task by asking the caregivers about the emotion their children normally expresses in each situation (see Appendix A for the Parent Questionnaire of the AKT); caregivers were given a choice of two emotions (e.g. Seeing a big although friendly dog: HAPPY/FEAR). For six of the items, they were asked to choose between positively and negatively valenced emotional response (e.g. HAPPY/SAD), and the remaining six items asked caregivers to choose between two different negatively valenced emotional responses (e.g. FEAR/ANGER) (Denham, 1986).

Scoring and Analysis

Both portions of the AKT were scored using a 3-point scale (Denham, 1986). A score of 2 was given if the child chose the exact emotion that the experimenter expressed. A score of 1 indicated an emotional face that was of the same valence as the target emotion (positive or negative), but not the same emotion (e.g. sad for afraid). A score of 0 was given if the child chose the incorrect emotion. Also for both portions, if there was a discrepancy between the child's verbal answer and the detachable emotional face the child choose, the latter was taken as the score.

To create the variable *Child Emotion Understanding*, the mean value of the standardised scores for both portions, *Affective Labelling* and *Affective Situation Knowledge*, was calculated to reduce the number of variables included in subsequent analyses. This is consistent with previous research (Denham, Bassett, Brown, Way, & Steed, 2013). Internal consistency was Cronbach's α=.83, which was an acceptable level and similar to previous research (Denham & Kochanoff, 2002; Denham, 1986).

Mutual Eye Gaze and Caregivers' Warmth – I Love You Task

The caregivers' expression of affection towards their child and their mutual eye gaze were recorded using the I-love-you task which was 1.5 minutes long (Dadds et al., 2014; Dadds, Allen, et al., 2012). During this task, caregivers were asked to show their affection towards their children in a way that was most comfortable to the caregivers. The I-love-you task was conducted at the end of the 90 minute research session when caregivers and children had completed all tasks. For verbal instructions, it is referred to previous research by Dadds and colleagues (2014) or see Appendix B.

Coding and Scoring

Caregivers' warmth was determined according to whether caregivers initiated or rejected physical and verbal affection as well as whether they initiated or rejected eye contact with their child. Further, the caregivers' level of comfort and genuineness in the task context was also observed and coded; that is, the observers coded whether caregivers' and the child's facial expressions seemed relaxed (e.g. smiling) or their actions and movements seemed hesitant and self-conscious (e.g. looking at the camera) (Dadds et al., 2014; Dadds, Allen, et al., 2012). All variables were coded using a 5-point scale from "not at all" (1) to "very much so" (5). Finally, the length of mutually locked eye gaze between caregiver and child was noted and then divided into categories of durations, because time-based measures are often skewed. Thus, a 5-point scale was used: "no mutual eye gaze" (0), "momentary or less than one second "(1), "one to three seconds" (2), "three to five seconds" (3) and "longer than five seconds" (4). Caregiver and child eye gaze was considered mutually locked when the caregiver and child looked into each other's' eyes and was

broken when one of the two looked away. See Appendix B for detailed scoring and coding criteria.

Caregivers' affectionate behaviour during this task was coded by two trained coders who were blind to the outcomes of the other measures (Dadds et al., 2014; Dadds, Allen, et al., 2012). Interrater reliability as measured using the Intra-class Correlation coefficient (Bartko, 1966; Hallgren, 2012) which was considered good at a level of .60 and excellent at a level of .75 (Cicchetti, 1994; Hallgren, 2012). Recordings of all 57 dyads were coded by both coders, and interrater reliability ranged from .64 for caregivers initiating eye contact with their children to 1.00 for caregivers' verbal rejection (see Appendix D for all ICCs). All I-love-You variables were coded by both coders with an ICC >.80. For use in subsequent analyses, the average of the two coders was used for each variable.

Caregivers' Use of Mental State Language

Caregivers and children were presented with eight short animations of the Happé-Frith Triangle animations (Abell et al., 2000) on a 9.7 inch tablet, and were between 34-45 seconds long. Animations depicted two silent triangles moving about the screen. Two animations from the Happé-Frith Triangle animations database were used for practice. For examples of the animations see https://sites.google.com/site/utafrith/research#TOC-Tasks-to-probe-intuitive-mentalising-in-high-functioning-adults- or see Appendix C. Caregivers were asked to describe to the children what was happening on the screen concurrently.

In prior research, the Triangle Animations has been used to investigate the understanding of mental states in adults and children with autism (Castelli, Frith, Happé, & Frith, 2002). In a previous study using silent animations of similar shapes

in motion, participants attributed human characteristics, intentional movements, goal-directed interaction and mental states to the moving shapes (Heider & Simmel, 1944). The Triangle Animations provide a measure of mentalising abilities of caregivers taking part in the present study which also indicates the extent to which the caregivers communicate about such mental states to their child. Thus in the present study, caregivers' verbal descriptions of the triangles' movements were used to determine caregivers' mental state talk.

Scoring and analysis

Caregivers' descriptions of the triangle movements were recorded, and once transcribed, were coded offline based on two dimensions and using scoring criteria based on Castelli and colleagues (Castelli et al., 2002; Castelli et al., 2000). The caregivers' descriptions were coded on *Intentionality* attributed to the triangles' movements and *Appropriateness* of these attributions. *Intentionality* was scored on a six-point scale with 0 as "action, non-deliberate" (e.g. bouncing off), 1 as "deliberate action with no others" (e.g. swimming or dancing), 2 as "deliberate action with somebody else (e.g. fighting or following), 3 as "deliberate action in response to other's actions" (e.g. chasing or guarding), 4 as "deliberate action with reference to mental states" (e.g. mocking or encouraging), or 5 as "deliberate action with explicit goal of affecting another's mental state" (e.g. persuading or surprising). *Appropriateness* was scored on a 3-point scale according to how accurately it reflected the situation with 0 as "don't-know answers, or descriptions that focus solely on a minor aspect of the situation", 1 as "partial description of the sequence", or 2 as "spot-on [accurate] descriptions of the story or actions represented" (see Appendix C for detailed coding criteria). For the purpose of ensuring good reliability, twenty percent of the data was randomly chosen and coded by a trained

second coder. Inter-rater reliability was determined using Intra-class Correlation coefficients. For *Appropriateness* and *Intentionality* scores, ICC were.87 and .88, respectively. Since the reliability was good, the rest of the coding was done by the first coder.

Caregivers' Emotion Understanding

Caregiver's emotion understanding skills were assessed from a set of 24 static facial emotion expressions (see Appendix A for examples). Emotional faces were presented randomly on a 15.6 inch computer screen using E-Prime 2. Participants responded using a forced-choice list of options of emotional labels using the keyboard. The choices of emotional labels were fear, sadness, surprise, disgust, happiness and anger. The picture remained on the screen until the caregivers made a response by pressing one of the keys corresponding to one of the six emotional choices.

Facial emotion expressions were posed by four actors, two female and two male actors, who acted out each emotion at its peak using expressions which adhered to criteria as outlined by Ekman (Ekman & Scherer, 1984). Test-retest reliability of facial emotion expressions was tested with three sets of cohorts, preschoolers, preadolescents and adolescents prior to the present study and was found to be good ranging between .72 to .84.

In order to take into account response bias with caregivers' rate of correct responses in line with previous research (Wolf & Centifanti, 2014), unbiased emotion recognition accuracies were calculated by emotion-type (see CHAPTER TWO for specifics of the method). Finally, for the purpose of data reduction, negative and positive composites of caregivers' emotion recognition skills were

created. This was done by taking the standardised scores of each of the caregivers' corrected emotion understanding scores. For each category, i.e. positively valenced or negatively valenced emotion expressions, the means of the standardised scores were calculated. Also due to technical difficulties, emotion recognition data for 10 caregivers had to be omitted or were lost.

3.2.3 General Procedure

Caregivers were approached about this research project via their children's school, nursery or *SureStart* children's centres. They were told about the purpose of this study and were invited to participate in a 90 minutes session at either the children's home or school/nursery. Caregivers were informed about the general structure of the session including key information about the I-Love-You task either over the phone, via email or in person without the child listening (Dadds et al., 2014) since for the test it is essential that the child is unaware of the details of the I-love-you task.

During the laboratory session, caregivers were briefed about the study while the children familiarised themselves with some of the materials (e.g. puppets).Children were told about the three tasks they would be asked to complete and that they would get a sticker upon completion of each task.

Following the caregivers' written and the children's verbal consent, the children completed the British Picture Vocabulary Task 3rd Edition (BPVS-III; Dunn, Dunn, Sewell, & Styles, 2009) with the researcher while caregivers completed a set of questionnaires (reported in CHAPTER FOUR). Throughout testing, caregivers stayed in the same room as their child to assure that they felt comfortable in an unfamiliar situation and with the researchers. Following the completion of the

BPVS-III, children completed all portions of the Affective Knowledge Test (AKT; Denham, 1986). At this point, children and researcher had been interacting together for about 30 minutes to build rapport to aid the completion of the AKT. Caregivers completed the emotion labelling task at this point.

Once both caregivers and children had completed the emotion understanding tasks, the caregiver-child interaction followed which was video-taped for offline coding. For this purpose, one camera was set up with a side angle view, so that coders were able to see the facial expressions of both caregiver and child. Then, caregivers and children watched the Happé-Frith Triangle Animations (Abell et al., 2000) together. Then, caregivers and child completed the I-Love-You task. At the end of the session, caregivers and children were debriefed and thanked for their participation.

3.2.4 **Data Analytic Strategy**

To test whether normal distributions of variable frequencies can be assumed, z-tests were used to determine the distribution of variables. For sample sizes equal to or less than 50, it was assumed that z-scores of equal and less/greater than 1.96/-1.96 assumed a normal distribution. Thus, all variables but caregiver verbal affect expressions and caregivers' rejection of child's affect during the I-Love-You task were normally distributed. To account for non-normal distribution of caregiver verbal affect as well as a small sample size, Spearman's correlation analyses were employed. Further, caregiver rejection variables (rejecting verbal affect, physical affect and eye contact) were excluded from following analyses based on very little to no variance.

Since the use of many correlational analyses increases the risk of Type I errors, the level of significance ($p<.05$) was adjusted appropriately. For Bonferroni-corrections, statistical power to infer statistical significance and sensitivity to detect a true effect is reduced and may be too conservative; hence, more Type II errors are probable. Therefore, a procedure to account for false discoveries in a post-hoc manner rather than a priori was applied to the data. Benjamin and Hochberg (1995) suggested a False Discovery Rate (FDR) controlling procedure to determine the proportion of false positives within statistically significant results and to control for this proportion. That is, the FDR controlling procedure allows the researcher to make a decision about how many statistical significant findings are probably true using the following procedure. First, (a) planned correlational tests were run and p-values for each test were recorded. Then, the p-values were sorted in ascending order (b). Further, a False Discovery Rate was chosen (c) and designated as *q* while the number of statistical tests was designated as *m.* For the present study, the False Discovery Rate was set at a level of *q=.05.* Finally, the following procedure *i*q/m* was used to calculate a decision criterion where *i* represents the place of the p-value in the list created earlier (b) starting with the largest p-value in the list which equals the largest *i* (d). This procedure is repeated with each p-value following the list in descending order until the p-value is equal to or less than the decision criterion, $p_{(i)} \leq i*q/m$. This decision criterion is then used as an adjusted p-value to determine the level of statistical significance for the present research.

One aim of the present study was to test the indirect effect of caregivers' emotion understanding skills on children's emotion understanding via caregivers' mental state talk and their mutual eye gaze. For this purpose, mediation models were run using the PROCESS macro for SPSS (Version 2.13; Hayes, 2013) producing

bootstrapped confidence intervals based on 5,000 bootstrapped samples as inferential testing of statistical significance. Bootstrapping makes use of sampling distribution of the current sample which is advantageous if the sample is a good representation of its population.

3.3 **Results**

Preliminary Analysis

Table 3.2. shows the descriptive statistics of the main study variables. The main variables were caregivers' warmth, caregivers' use of mental state talk, children's and caregivers' emotional understanding. They were correlated with demographic variables such as children's age and verbal ability, and caregivers' educational level. Previous research showed that children's emotion understanding, in particular, is influenced by these variables (Denham et al., 2013). For inclusion in preliminary analyses, ordinal values of caregivers' educational level were used.

Spearman's correlations between demographics and main variables revealed that children's emotion understanding was not related to their verbal ability (r_s =.23, p = .12) as measured using the BPVS-3rd Edition (Dunn et al., 2009). Children's age was significantly positively related to the level of emotion understanding (r_s=.68, p<.001), with older children being more accurate in labelling emotion expressions during both portions of the AKT. To control for age in subsequent analyses, total child emotion understanding as measured using the AKT was age-corrected. For this purpose, the residual variable of child emotion understanding

Table 3.2 Descriptives of Main Variables.

	N	*M*	SD	Min	Max	Skewness z-score	Kurtosis z-score
BPVS-III	55	103.60	10.09	78.00	120.00	-1.71	-.81
Child EU:	48	.06	.39	-.76	.54	-1.57	-1.63
I-Love-You Task - Caregivers:							
Physical Affect	55	3.75	.78	2.00	5.00	-.96	-.22
Verbal Affect	55	3.75	.98	1.00	5.00	-2.68	1.47
Eye Contact	55	3.38	.70	1.50	5.00	-.44	.31
Comfortable	55	7.36	1.71	3.00	10.00	-1.06	-.25
Mutual Eye Gaze	55	1.96	1.01	0.00	4.00	1.01	.71
Mental State Talk:							
Intentionality	50	2.99	.59	1.29	4.00	-1.87	.65
Appropriateness	50	.78	.32	.13	1.50	1.02	-.76
Caregiver EU:							
Positive	47	.02	.84	-1.78	1.65	.66	-1.21
Negative	47	.01	.72	-1.66	1.19	-1.09	-.73

was created by regressing age onto the variable and saving the residual (Lynam, Hoyle, & Newman, 2006). The saved residual was then used for subsequent analyses.

Further, neither caregivers' negative nor positive emotion understanding skills were significantly related to any of the demographic measures. However, greater use of verbal affection expressed by the caregiver during the I-Love-You task was related to the caregivers having

completed their education to a higher level (r_s=.29, p<.05). Additionally, how comfortable the caregivers seemed during the I-Love-You task was also positively positively related to the caregivers' higher educational level (r_s = .33, p<.05).

Does emotion understanding in children relate positively to their caregivers' emotion understanding skills?

Spearman's correlational analyses examined whether caregivers' levels of emotion understanding skills were related to emotion understanding in their children. No significant association between either the children's emotion understanding and caregivers' emotion labelling accuracy of positive emotion facial expressions (r_s=-.10, p=.52), or between children's emotion understanding and caregivers' emotion labelling accuracy of negative emotional facial expressions were found (r_s=-.05, p=.74).

Does emotion understanding in children relate positively to mutual eye gaze, caregivers' warmth and caregivers' mental state talk?

The association between caregivers' physical and verbal affect with children's emotion understanding was of interest. Results revealed significant associations between caregivers expressing their affect verbally and greater child emotion understanding (r_s=.34, p<.05); however, caregivers' physical affect expression towards their children was not associated with child emotion understanding (r_s=.14, p=.35). That is, children showed better emotion understanding when caregivers expressed their affection verbally by praising their child (e.g. "Well, I think you did fantastically in that task. Look at me. Well done. Great job."), but it did not reach significance with physical affection. Second, there was no significant

association between children's emotion understanding and caregivers initiating eye contact (r_s=.10, p=.51), or children's emotion understanding and mutually eye gaze between children and caregivers (r_s=-.19, p=.21). Finally, children's emotion understanding was not related to caregivers' mental state talk either measured through appropriateness (r_s=-.00, p=.99) or intentionality (r_s=.03, p=.84); these were measured as the caregivers' description of the triangle animations.

Table 3.3 Spearman's Correlation Coefficients between Total Child Emotion Understanding/Caregiver Negative and Positive Emotion Recognition Skills and Caregiver—Child Interaction.

		Caregiver Affect Expression				**Caregiver Mental State Talk**	
	Total Child EU	**Physical Affect**	**Verbal Affect**	**Initiating Eye Contact**	**Mutually Locked Eye Gaze**	**Intentio-nality**	**Approp-riateness**
Total Child EU	-	.139	.340	.097	-.186	.032	-.002
Caregiver EU:							
Positive	-.102	-.145	-.139	-.091	-.134	-.500*	.072
Negative	-.054	.124	.151	-.229	.412*	-.300	.324

*<.005

Additionally, caregivers' accurate recognition of negative emotional facial cues was related to length of mutually locked eye gaze with the caregiver and child dyads (r_s=.41, p<.01). Caregivers and children demonstrated longer locked eye gaze during the I-Love-You task when

caregivers were better at recognising negative emotional facial cues. Also, caregivers' use of mental state talk, appropriateness (r_s=.32, p<.05) and intentionality intentionality (r_s=-.30, p<.05) were significantly related to their negative emotion understanding skills. However, caregivers' accuracy in recognising positive emotional facial cues was related to only one aspect of mental state talk, specifically attributing intentionality to the triangles' movements (r_s=-.50, p<.001).

Further using the FDR controlling procedure (Benjamin & Hochberg, 1995) and a False Discovery Rate of q=0.05, the test with the highest rank i for which the p-value is less than or equal to $i*q/m$ is the test at rank two ($p_{(2)}$ = 0.0040 ≤ 2*0.05/20 = 0.005), so that the adjusted p-level is calculated at p=0.005. Therefore, two associations were found to be statistically significant. These were: greater *caregivers' positive emotion understanding* was significantly associated with *less attribution of intentionality to the triangles' movements by the caregivers*, and *greater negative emotion understanding* was significantly associated with a *longer mutually locked eye gaze*. See a summary of Spearman's correlation coefficients in Table 3.3 with the adjusted significance level.

Do mutual eye gaze or caregivers' mental state talk operate as mediators between caregiver and child emotional understanding skills?

Furthermore, two separate simple mediation models were tested using PROCESS (Hayes, 2013) in line with the hypotheses. The first mediation model examined the indirect effect between caregivers' positive emotion understanding and child emotion understanding with mental state talk, namely intentionality, as a mediator. As can be seen in Table 3.4. and Figure 3.1., caregivers who demonstrated good emotion understanding skills of positive emotional facial cues such as happy

Table 3.4 Model Coefficients for Mediations (indirect effect) Between Caregiver and Child Emotion Understanding.

		Consequent						
		M				Y (CHILD EU)		
Antecedent		**Coeff.**	***SE***	**p**		**Coeff.**	***SE***	**p**
X (PARENT POSITIVE EU)	a	-.337	.108	<.01	c'	-.039	.072	.588
M (Intentionality)		-	-	-	b	-.064	.096	.509
Constant	i_1	2.935	.085	<.001	i_2	.180	.285	.532
			R^2=.200				R^2=.014	
			F(1,39)=9.775, p<.01				F(2,38)=.261, p=.772	
X (PARENT NEGATIVE EU)	a	.537	.212	<.05	c'	-.010	.075	.890
M (Mutually Locked Gaze)		-	-	-	b	-.108	.053	<.05
Constant	i_1	.795	.768	.307	i_2	-.214	.254	.405
			R^2=.229				R^2=.143	
			F(2,38)=5.658, p<.01				F(3,37)=2.056, p=.123	

and surprise also tended to attribute significantly fewer intentionality to the triangles' movements (a=-.337, p<.01). However, caregivers' attribution of intentionality did not significantly predict total child emotion understanding (b=-.064, p=.509). Further, no significant indirect effect (ab=.022) via caregivers' use of mental state

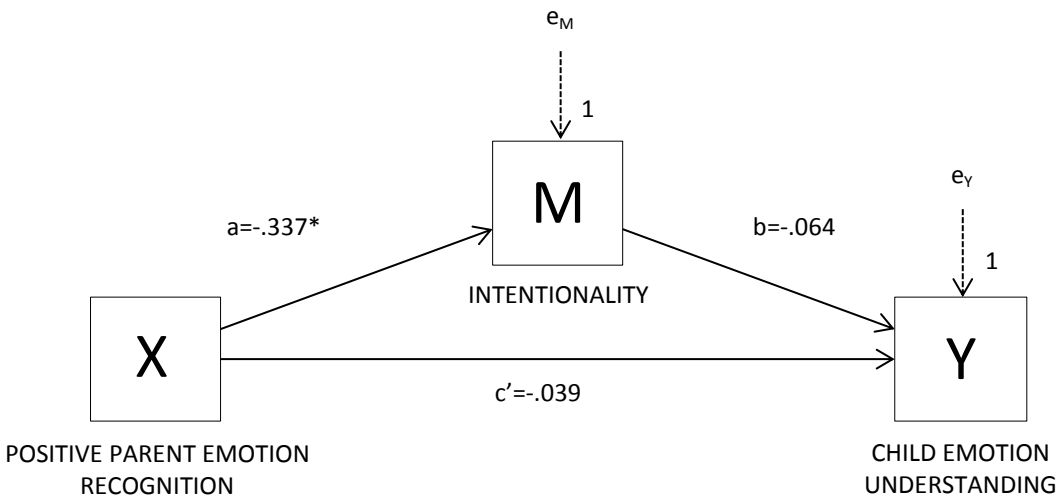

Figure 3.1 Mediation Model A) between Positive Caregiver Emotion Recognition and Child Emotion Understanding via Caregivers' Attribution of Intentionality. Note: *p<.05

talk was supported based on bias-corrected bootstrap confidence intervals which were run with 5,000 bootstrap samples included zero (-.026 to .104).

A second mediation model tested the indirect effect between caregivers' negative emotion understanding skills and child emotion understanding via length of mutual eye gaze between caregivers and their children. The observation on how comfortable the caregivers seemed during the I-Love-You task was also entered into this model as a covariate. A summary of this mediation model is presented in Table 3.4. and Figure 3.2. As can be seen, caregivers who showed a good accuracy in recognising negative emotions from other's static facial expressions also spent longer in eye gaze with their child (a=.537, p<.05). Conversely, children who spent longer in eye gaze with their caregivers showed poorer emotion understanding skills (b=-.108, p<.05). This mediation model revealed a significant indirect effect between caregiver emotion understanding skills of negative emotion facial cues and total child emotion understanding mediated by mutually

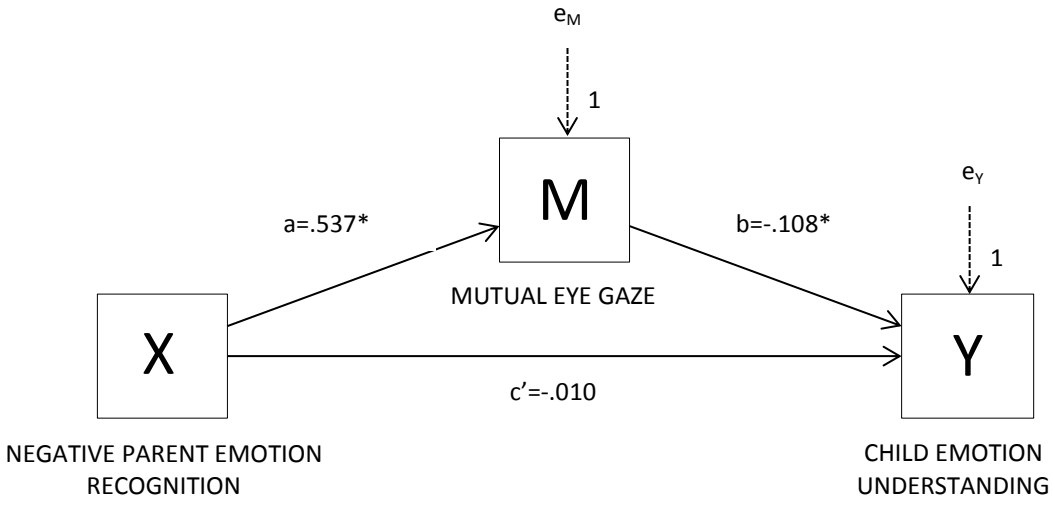

Figure 3.2 Mediation Model B) between Negative Caregiver Emotion Recognition and Child Emotion Understanding via Length of Mutually Locked Eye Gaze. Note: *p<.05

locked eye gaze (ab=-.058) as bias-corrected bootstrap confidence intervals based on 5,000 bootstrap sample was found to be entirely below zero (-.137 to -.010). Caregivers' better understanding skills of negative facial emotion expressions were related to the children's poorer emotion understanding. This was because they were locked in prolonged mutual eye gaze.

3.4 **Discussion**

The unique relationship between caregivers and children plays an important role in scaffolding the children's development of emotion understanding. Caregivers scaffold through drawing the children's attention to others' emotional states by talking about these to their children (Hammond et al., 2012; Svetlova et al., 2010) and non-verbally engaging them in mutual eye gaze (MacLean et al., 2014). However, results here did not support a significant association between children's emotion understanding and their caregivers' use of mental state talk, mutual eye gaze or caregivers' warmth. Instead, caregivers' own emotion understanding was found to be related to mutually responsive eye gaze and their use of mental state talk. Therefore, the results of the present study, although they are cross-sectional, suggest that caregivers' own understanding of emotion expressions has an impact on the reciprocity of parent-child interaction, specifically eye mutual eye gaze. However, present findings demonstrated a negative mediational effect predicting poorer child emotion understanding when children are locked in mutual eye gaze with their caregivers for a prolonged period.

An indirect link between caregiver and child emotion understanding via mutual eye gaze was not an unexpected result as such; however, the negative direction of the indirect effect was. In the present study, children whose caregivers show better skills in recognising negative facial emotion expressions demonstrated a low level of emotion understanding as a result of prolonged mutual eye gaze. Present findings showing that caregivers' accuracy in recognising facial expressions of negative emotions, such as sadness, fear, disgust and anger, predicted longer eye gaze between caregivers and children is supported by previous research. Direct eye gaze has been found particularly important in previous for two reasons; that is, direct gaze can cue attention to important emotional cues (e.g. Senju & Csibra, 2008; Taylor, Itier, Allison, & Edmonds, 2001) and helps to recognise distress emotions such as sadness and fear itself (e.g. Adolphs et al., 2005). In this way, caregivers can identify and monitor distress expressed by their child to respond sensitively to the child. In the same light, caregiver-child mutual eye gaze can be an essential for the caregivers communicate their own desire, intention and emotion states (Tomasello, 1995; Tomasello et al., 2005).

Either function of eye gaze can contribute positively to caregiver-child emotion socialisation and communication, and thereby predict better emotion understanding in children. This is where current results did not confirm the hypothesis that children's level of emotion understanding is greater as a function of longer mutual eye gaze and deviated from previous research. Indeed, children's ability to coordinate joint attention, that is to monitor the caregivers' focus of attention, previously suggested that longer caregiver-child eye gaze has a positive impact on the children's accuracy to read other's emotion states (Lee, Eskritt, Symons, & Muir, 1998; Nelson & Russell, 2011; Tomasello, 1995).

Children play an active role when interacting with their caregivers (Kochanska, Kim, & Boldt, 2013); that is, caregivers can create an optimal environment, but the children's response may not be optimal for developing good emotion understanding. There are different explanations as to why prolonged mutual eye gaze between caregiver and child predicted poor children's emotion understanding in this mediation model. On the one hand, the caregiver's direct gaze could have acted as an attentional cue for the children to look at the caregivers and identify the caregiver's intent and emotion state, but children's abilities to maintain eye gaze may not have been consistent enough (Doherty-Sneddon, Bruce, Bonner, Longbotham, & Doyle, 2002). On the other hand, caregiver's direct eye gaze may be important for the cueing of the child's attention (Farroni et al., 2003; Farroni et al., 2007); however, there are other information within the social context or caregiver's gestures such as pointing to objects and other people that can help the children to read their environment accurately and convey intent. For the children to determine where the caregivers attend to and communicate needs and emotions, the combination of gaze and gestures such as pointing is important (Estigarribia & Clark, 2007). Prolonged eye gaze may prevent the children to take into consideration other important information conveyed by the caregivers' gestures. It is this combination of attentional and intentional cues which can help the child to make sense of their emotional and social surroundings, and scaffold the children's emotional understanding (Harris et al., 2005).

Furthermore, children whose caregivers used mind-related comments about the triangles did not show better emotion understanding either. This is

in contrast to expectation in the present study, and is inconsistent with prior research (Harris et al., 2005). That is, prior research has found that when caregivers spend time talking about and explaining the feelings and desires of characters while reading a story book together with their children, children show better understanding of others' emotion states (Symons, 2004) and are more likely to respond appropriately to emotions (Drummond et al., 2014). Staying within the framework of proximal zone of development (Taumoepeau & Ruffman, 2006; Vygotsky, 1978), children are guided by their caregivers in using mental state language, and learn about other's internal states and emotional responses, thus further bootstrapping their development of emotional understanding.

A lack of association between caregivers' mental state talk and child's emotion understanding may be due to caregivers attributing mental and emotion states to movements of animated objects rather than to people's facial expressions. The decision to use triangles instead of human characters in the story was intended to elicit mental state attributions based on the movement properties rather than features of the characters (Abell et al., 2000; Rimé, Boulanger, Laubin, Richir, & Stroobants, 1985). The animations of triangle movements have successfully simulated body movements and gestures before (Castelli et al., 2000). However, the presence of personifying features that convey distinct emotion expressions such as facial expression may be specifically important for children to connect mental state talk with the appropriate emotion expressions to internalise an understanding of emotion than expected. Indeed in previous research, young children attributed fewer mental and emotion states to inanimate objects which do not have personifying features such as facial expressions, and to which the children do not feel emotionally connected (Gjersoe, Hall, & Hood, 2015). The presence of facial expression when caregivers

talk about others' mental states may be important for scaffolding children's understanding that is specific to recognition and naming of emotional facial expressions. For the purpose of social referencing, children may not learn to associate mental states with emotion expressions without facial expressions.

In addition, the absence of facial expressions could have also affected the appropriateness of caregivers' mental state talk. It is the combination of body movements with facial expressions which seem important in knowing the appropriate mental state of another person (Gunes & Piccardi, 2007). The absence of facial expression for the triangles' movements may have affected such an appropriateness of the caregivers' mental state talk. Indeed on average in the present study, caregivers' description of the triangles' intents during each sequence tended to be either inaccurate or incomplete (Mean=.78, SD=.32).

The concept of mind-mindedness offers a way to make sense of the current results; that is, the combination of the caregiver's willingness to use mental state talk and possessing an appropriate understanding of other's mental and emotion states, is the key to the child's own understanding of others mental and emotion states. Merely talking about mental states without the appropriate understanding may not be enough. Indeed, previous research investigating maternal mind mindedness found that it is the mother's appropriate mind-related comments which predicted the children's understanding of other's mental states rather than just the use of such comments (Meins & Fernyhough, 1999). Therefore, the success of the caregiver's scaffolding using mental state talk with their child is dependent on mind-related comments that reflect the caregivers' good understanding of

other's mental and emotion states by the caregivers. Hence, without an accurate explanation of other's mental and emotion states, e.g. the triangle's mental and emotion states in the case of the present study, caregivers cannot impart accurate knowledge about mental and emotion states to their child. So to promote child's understanding of mental and emotion states through caregivers' mental state talk during book reading time together with their child, the presence of facial expressions may be pivotal, especially in early childhood.

Another unexpected result of the present research concerned the low association between child's emotion understanding and child's verbal ability. This was an unexpected finding given that previous research found a consistent association between the two variables, specifically when verbal ability was assessed using the British Picture Vocabulary Scale (e.g. Centifanti et al., 2016). In contrast to previous research, the present study made use of the age-corrected residual of child emotion understanding which was entered into the regression models. Present results may indicate that it was the variance in child emotion understanding which was dependent on age that was related to the child's verbal ability in previous research. Another explanation could be in relation to the way the children's labelling of emotional faces was recorded and scored. Specifically, when the child's verbal answer differed from the emotional faces he or she pointed at, the latter was recorded. Hence apart from the first emotion-labelling portion of the Affective Knowledge Test, which was the only portion that required the child to respond verbally, a verbal response was not needed. Indeed, when looking at the correlation between the emotion labelling portion of the AKT alone and the child's verbal ability, an association was found (r_s= .37, p<. 01).

The current research also presented some constraints of statistical power considering the sample size. In the present research, non-parametric analyses were used to account for a non-optimal sample. Limitations should be considered in research as an inevitable opportunity for finding a resolution and which in turn encourages further investigations. For instance in the present study, the children's response as an active social partners in their interaction with their caregivers were not the focus of this study. Since the children talked little about emotions, their verbalisations were not included. Further, research on caregiving can suffer from methodological limitations as caregivers report on their caregiving style or shared method variance as caregivers also report on child outcomes. The intention and strength of the present study were used to avoid that, and provide observations of caregiving behaviour to assess the use of positive caregiving styles in relation to child outcomes which have also been assessed independently of caregivers' reports. Additionally, observations of caregiving measures were coded by different groups of randomly chosen postgraduates with an expertise in aspects of child development.

3.5 **Summary**

In conclusion, the present research is a significant contribution to the current body of research that considers different ways caregivers can scaffold their children's emotional development. Although in the present research, a meaningful link between caregivers' warmth and mental state talk with children's emotion understanding skills is missing, two important conclusions have emerged here. That

is first, the development of caregivers' own advanced emotional understanding skills may be the basis for mutually responsive interaction between parents and child, even though prolonged mutual eye gaze had a negative effect on the child's emotion understanding. Second, the present finding involving mutual eye gaze suggests that caregivers may provide an optimal environment; however, if the child's response is not optimal the effectiveness of caregivers' scaffolding is reduced (Kochanska, Kim, Boldt, & Nordling, 2013). So, it is about their mutually responsive relationship and their preparedness to engage with each other on an emotional level which matters.

CHAPTER FOUR – YOUNG CHILDREN WITH CALLOUS-UNEMOTIONAL TRAITS AND THEIR RESPONSE STYLE TO PARENTAL AFFECTION ARE DEPENDENT ON PARENTS' EMOTION UNDERSTANDING

4 Abstract

Parental scaffolding of child emotion understanding is dependent on the children's willingness to engage with the parents on an emotional level which in turn is dependent on the children's temperament. Callous-unemotional traits are symptomatic of reduced responsiveness towards their parents, specifically eye gaze, which is thought to underlie impaired emotion understanding. Also, parents' own emotion understanding may play an important role in their children's responsiveness. For this purpose, 57 dyads of three to five year old children and their parents completed the Affective Knowledge Test (Denham, 1986) and an emotion labelling task with static pictures of facial expressions, respectively. Parents rated child callous-unemotional traits using the preschool version of the Inventory of Callous-Unemotional traits and child externalising behaviour problems using the Behavioral Assessment System for Children (Reynolds & Kamphaus, 1992). Finally, children's response to parental affection was observed and coded during the I-Love-You task (Dadds et al., 2014). Results did not replicate impaired emotion understanding or reduced eye gaze as a response to parental affection for children with elevated levels of callous-unemotional traits. Instead, these children showed reduced eye gaze and physical touch combined. Additionally, child callous-unemotional traits mediate impaired sad recognition and the children's dismissive response. Results and implications are discussed in connection with previous research suggesting that

parents' poor emotion understanding may pose a risk for children with callous-unemotional traits and the way they interact with each other.

4.1 **Introduction**

Children's internalisation of emotion understanding is rooted in their emotional exchange with their parents (Denham, 2007), and scaffolded by the parents' emotion experience and sensitivity (Hammond & Carpendale, 2015). Part of their emotional exchange is that children seek out the parents' confirmation and feedback to know how to read and respond to their emotional environment (Hirshberg & Svejda, 1990; Kochanska, 1993). This suggests that children play an active role as a social partner in their interaction with others including their parents. Specifically, it seems that it is the children's willingness to engage and respond to others, which mediates their developmental outcomes such as emotion understanding skills (Kochanska, Kim, & Boldt, 2013; Kochanska, Kim, Boldt, & Nordling, 2013). Further, the manner in which children engage and respond to their parents may be shaped by the children's own temperament (Hastings et al., 2007; Hawes et al., 2011). For instance, children with a fearless and disinhibited temperament are more at risk of maladjusted outcomes when exposed to harsh parenting, and are more susceptible to warm and mutually responsive parenting (Kochanska et al., 2014).

Reduced Responsiveness and Eye Gaze

Children with callous-unemotional traits which are associated with a temperamental fearlessness show a lack of responsiveness towards attachment

figures such as their parents (Dadds et al., 2011) which has important implication for their development of emotion understanding. Young children aged 4 to 8 years with elevated levels of callous-unemotional traits show difficulties in engaging with their parents during an emotional interaction such as showing affection towards each other (Dadds et al., 2014). Specifically, these young children displayed reduced eye gaze towards their parents which contributes to their lack of emotional engagement with their parents (Dadds et al., 2011). Given that eye gaze helps to identify others' and communicate own emotions and desires (Ganel, Goshen-Gottstein, & Goodale, 2005; Rigato & Farroni, 2013; Senju & Csibra, 2008), which in turn encourages mutually responsive interactions and positive affect between parents and children (MacLean et al., 2014). Children's lack of responsiveness towards parents' eye gaze can prevent parent and child from forming a mutually responsive and warm relationship (Wagner, Mills-Koonce, Willoughby, Zvara, & Cox, 2015). This is because young children with high levels of callous-unemotional traits who fail to respond to their parents in a sensitive manner are perceived by the parents as unpredictable and unreadable (Kochanska, Kim, Boldt, & Yoon, 2013). This is in line with a disorganised attachment style associated with child callous-unemotional traits in children (Pasalich, Dadds, Hawes, & Brennan, 2012). Parents who have difficulty to read and understand their child's emotions, cannot empathise and respond to their child in a sensitive manner. Insensitive responding can trap parents and child in a cycle of unsuccessful and ineffective interaction (Goldberg, 1977; MacLean et al., 2014), which in turn is related to maladjusted outcomes in children with callous-unemotional traits (Kochanska, Kim, Boldt, & Yoon, 2013) and may interfere with parental scaffolding of the child's emotion understanding.

Previously, reduced attention to others' eye regions was thought to underpin a failure in noticing distress cues linked to callous-unemotional traits, specifically fear in other's (e.g. Dadds et al., 2008). Biological evidence supported this theory demonstrating an underactivation of the amygdala related to callous-unemotional traits when children viewed fearful facial expressions (Jones et al., 2009). However, children who were rated as high in callous-unemotional traits not only showed an impaired recognition of distress emotions (Blair, 1999; Blair et al., 2001; Dadds et al., 2008; Dadds et al., 2006; Kimonis et al., 2007), but other negative emotions such as anger (Muñoz, 2009), disgust (Sylvers et al., 2011) and pain (Wolf & Centifanti, 2014). The selective attention hypothesis explains this impairment as a failure to reallocate attention to salient stimuli which are goal-irrelevant for children with callous-unemotional traits (Larson et al., 2013) and is not limited to fear or other distress emotions (Dawel et al., 2015). In this light, children with elevated levels of callous-unemotional traits who demonstrate a lack of engagement in eye gaze with parents do so because it is not relevant to their current goals. Engaging in eye contact with parents shows the parents that they have their child's full attention (Tomasello, 1995) in order to assist them in their emotion understanding and how to respond sensitively towards other's emotions. Reduced eye gaze during early parent-child interactions, therefore, explains why children with high callous-unemotional traits do not develop typical levels of empathy (Dadds et al., 2011).

Children with high callous-unemotional traits respond better to parental warmth and mutual responsiveness (Centifanti et al., 2016; Kochanska, Kim, Boldt, & Yoon, 2013). In line with the concept of differential susceptibility (Belsky, Bakermans-Kranenburg, & Van IJzendoorn, 2007; Belsky & Pluess, 2009), children with callous-unemotional traits may be at risk of maladaptive behavioural outcomes

which can be offset by a highly positive relationship between parents and child (Pardini et al., 2007; Waller et al., 2013; Waller et al., 2012; Waller et al., 2014). In contrast, ineffective parenting, e.g. poor monitoring, inconsistent discipline and corporal punishment, has the opposite effect in children with callous-unemotional traits as the risk of maladaptive outcomes increases (Wootton et al., 1997). Therefore, positive parent-child relationship can promote empathy and child responsiveness to parental guidance (Waller et al., 2013). In this way, the parents may be able to draw the attention to the important stimuli. Previous research supported this as children with callous-unemotional traits were explicitly directed to attend to other's eye regions for recognising facial emotional expressions. In this way, children who exhibited high levels of callous-unemotional traits were able to recognise fear in others as well as children with low levels of callous-unemotional traits (Dadds et al., 2008). As one way of teaching their child about emotions in others, parents may be able to draw their child's attention to important cues of emotion expressions (Dadds et al., 2014).

Parents' Emotion Understanding

Furthermore, warm and responsive parenting is dependent on the parents' own emotion understanding. As parents are able to read their children's emotion expression, they can adapt their behaviour in a way that is sensitive to the children's emotion states and needs (MacLean et al., 2014), which seems particularly important for engaging children with high callous-unemotional traits (Waller et al., 2013). Equally, parental emotion understanding skills are associated with an acceptance as well as an appreciation of their children's emotion expression and experience as an opportunity for intimacy where parents can help children understand and label

emotions (Gottman, Katz, & Hooven, 1996; Morris et al., 2007). In addition, research findings supporting a substantially heritable influence of callous-unemotional traits across generations (e.g. Viding, Blair, Moffitt, & Plomin, 2005) suggest that parents may demonstrate similar impairments identifying and paying attention to negative emotion expressions. If this is the case, mutual responsiveness between children with elevated levels of callous-unemotional traits and their parents could be interrupted. This also suggests that impairment in emotion understanding which is thought to underlie a lack of empathy and a distinct pattern of antisocial behaviour associated with callous-unemotional traits in children and adolescents go as far back as impairments in parental emotion understanding. However, there is no research to confirm this hypothesis to date.

The Present Study

The aims of the present study were three-fold. First, one aim was to examine the role children's varying levels of callous-unemotional traits play within parent-child interaction. Second, the present research aimed to test whether parents of children displaying high levels of callous-unemotional traits demonstrate impaired emotion understanding of negative emotional facial expressions. Third, it was of interest whether child callous-unemotional traits acted as a mediator between parent and child emotion understanding, and between child emotion understanding and child responsiveness.

To answer these questions, parents of three to five year old children were recruited through school, nursery or *SureStart* children centres to take part in this research together with their children. The sample is the same as in study 2 (see CHAPTER THREE). Further, children's emotion understanding was measured using

the Affective Knowledge Test (AKT; Denham, 1986). Parental emotion understanding skills were tested using an emotion labelling task with static facial emotion expressions. Additionally, parents rated their children on the preschool version of the Inventory of Callous-Unemotional Traits (ICU; Frick et al., 2004) which have been used with children from as young as the age of three years (Ezpeleta, Osa, Granero, Penelo, & Domènech, 2013; Kimonis et al., 2016; Kochanska, Kim, Boldt, & Yoon, 2013). Also, parents reported on children's behaviour using the Parent Rating Scales (PRS) of the Behavioral Assessment System for Children (BASC-II:PRS; Reynolds & Kamphaus, 1992). Finally, children's response to parents' affection was observed within the context of the I-Love-You task and coded using criteria provided by this task (Dadds et al., 2014; Dadds, Allen, et al., 2012).

Based on previous research, the following hypotheses were tested: first, high callous-unemotional traits in the young children of the present sample were expected to display reduced emotion understanding (Kimonis et al., 2016; White et al., 2016) as well as reduced emotional engagement with their parents that is specific to child's eye gaze (Dadds et al., 2014; Dadds et al., 2011). Second, I expected to find high levels of callous-unemotional traits in children to be associated with elevated levels of externalising behaviour problems (Frick et al., 2013). Third, parents are hypothesised to demonstrate some difficulties in emotion understanding similar to children with high callous-unemotional traits found in previous research (Blair, 1999; Muñoz, 2009; Wolf & Centifanti, 2014). Fourth, child callous-unemotional traits mediate an indirect link between parents' own emotion understanding skills and child's responsiveness.

4.2 Method

4.2.1 Participants

Participants were the fifty-seven caregiver-child dyads of Study 2. See further details about the sample in CHAPTER THREE.

The present study was conducted under ethical approval of the Psychology Department of Durham University. Schools, nurseries and SureStart children centres in Durham County also agreed that the researcher contacted and approached the caregivers. Compensation for the caregiver's time was offered in the form of £10 Amazon voucher and children received a sticker. Due to fatigue, two children did not complete all of the tasks and were excluded from further analyses.

4.2.2 Materials

Child's Receptive Verbal Ability

Consistent with previous research (Cutting & Dunn, 2003; Denham, 1986), children's receptive verbal ability data from the BPVS-III (Dunn et al., 2009) were entered as a covariate. In the present research, norm-referenced scores provided with the BPVS-III were used. For more details about this measure see CHAPTER THREE.

Screening for Autistic-Like Traits

The Childhood Autism Screening Test (CAST; Scott, Baron-Cohen, Bolton, & Brayne, 2002) is a parental screening questionnaire screening for autistic-like symptoms. Formerly known as the Childhood Asperger Syndrome Test, the CAST screened for core features of autism based on behavioural descriptions of the ICD-10 and DSM-4 in the present sample. The CAST consists of 37 items, 31 items of which are key items contributing to a children's total score. The remaining 6 items are control questions on general development and are not scored. Caregivers answered each item with either 'Yes' or 'No', and using a scoring key, a score between 0 and 31 can be obtained for each child. Additionally, the CAST also includes a Special Needs section with two further items assessing any other formal diagnosis or any other concerns expressed by any teacher or health visitor.

For the present study, the CAST score was included as a covariate. The inclusion of the CAST score as a covariate is important for this study as problems with eye contact has been associated with this disorder prior (Klin, Jones, Schultz, Volkmar, & Cohen, 2002), and the present study aimed to investigate eye contact as a function of callous-unemotional traits (Dadds, Allen, et al., 2012).

Behavioral Assessment for Children Scale 2nd Edition

Behaviours, such as adaptability, aggression, social skills, hyperactivity, anxiety, attention problems, atypicality, withdrawal and somatisation, were assessed using the Parent Rating Scales (PRS) of the Behavioral Assessment System for Children (BASC-II:PRS; Reynolds & Kamphaus, 1992), developed specifically for assessing preschool children's behaviour. Examples of items are respectively: 'Adjusts well to changes in routine', 'Threatens to hurt others', 'Makes friends

easily', 'Interrupts others when they are speaking', 'Is nervous', 'Pays attention when being spoken to', 'Eats things that are not food', 'Avoids other children' and 'Complains of pain'.

The BASC-PRS is a comprehensive multidimensional set of scales for caregivers rating their preschool age child's adaptive and behaviour problems. This assessment is a standardised rating system for community-based preschool children samples and their caregivers/teachers based on national norms from the USA (Merydith, 2001). Answering the items of the BASC-PRS uses a 4-point Likert scale; that is 'never'='N', 'sometimes'='S', 'often'='O' or 'almost always'='A'. This assessment was chosen as a very reliable and objective measure of behaviour often used in an educational context (Sandoval & Echandia, 1994). In the present study, the externalising behaviour composite was of particular interest as a covariate because of the unique and consistent link of behaviour problems to callous-unemotional traits (Frick et al., 2005; Frick & White, 2008; Viding, Frick, & Plomin, 2007). This composite was created by calculating the sum of the following two subscales: aggression and hyperactivity.

Children's Callous-Unemotional Traits

Caregivers completed the 24 items of the preschool version of the Inventory of Callous-Unemotional Traits (ICU; Frick, 2004) in order to assess the children's level of callous-unemotional traits. The ICU was developed to capture early symptoms of a lack of empathy and remorse, shallow affect and carelessness for doing things well and adhering to norms (e.g. "does not care who he/she hurts to get what he/she wants, does not let feelings control him/her, does not like to put the time into doing things well"), thus making it a good choice for the age group represented

by the present sample. Items of the ICU were rated by the caregivers on a 4-point Likert scale from "Not at all true" (0) to "Definitely true" (3). Ratings were summed up for each caregiver. Then, a total mean score across all of the caregivers' ratings was created. The total mean score showed good internal consistency (Cronbach's alpha equals .81) similar to previous research using the caregiver preschool version of the ICU (Cronbach's alphas equal .84 for mothers' and .86 for fathers' reports; Kochanska, Kim, Boldt, & Yoon, 2013).

Caregivers' Emotion Understanding

Emotion recognition skills of the caregivers were assessed from the same set of 24 facial stimuli presenting static emotion expressions as in CHAPTER THREE given a set of forced-choice options of emotional labels (see Appendix A for examples). The choices of emotional labels were fear, sadness, surprise, disgust, happiness and anger. Additionally, response bias with caregivers' rate of correct responses was taken into account in line with previous research (Wolf & Centifanti, 2014), unbiased emotion recognition accuracies were calculated by emotion-type (see CHAPTER TWO for specifics of the method). See CHAPTER THREE for more details on how caregivers' emotion understanding skills were measured. Caregivers' accuracy scores of each emotion were entered as predictors into regressional models. Finally due to technical difficulties, emotion recognition data of 10 caregivers had to be omitted or were lost.

Child Response to Parental Affection – I Love You Task

The caregivers' and children's expression of affection towards each other and their mutual eye contact were observed and coded during a 1.5 minute long love task

(Dadds et al., 2014; Dadds, Allen, et al., 2012). During this task, the caregiver was asked to show his/her affection towards his/her child in a way that is most comfortable to the caregiver. The love task was the same as in study two (see CHAPTER THREE for more details). However, for the present research, the child's response to the caregivers' affection was considered.

For the purpose of examining behavioural response patterns for children with high levels of callous-unemotional traits, expressions of affect towards their caregivers were coded (see Appendix B for scoring and coding details). More specifically, child affect response was coded for initiating or rejecting physical and verbal affection as well as initiating or rejecting eye contact. Further, the children's level of comfort and genuineness during the task was also considered. In the instructions to the coders, it was stressed that the behaviour of the children should be considered as responsive to that of the caregivers whereas the caregiver's behaviour was considered more task-orientated. Variables were coded using a 5-point scale from "not at all" (1) to "very much so" (5).

Coding and Scoring

The coding of the child's affective response during this task was done by two trained coders who were blind to the outcomes of other measures. Recordings of all 57 dyads were coded by both coders. Interrater reliability as measured using the Intra-class Correlation coefficients (Bartko, 1966; Hallgren, 2012) were lowest at .67 for child verbal rejection and highest at 1.00 for child's verbal affect (see Appendix D for all ICCs). All other variables were at a level of ICC >.80. For use in subsequent analyses, the average of the two codings was used for each variable.

4.2.3 General Procedure

The general procedure is identical to that of study two in CHAPTER THREE. In addition, while children started the session by completing the British Picture Vocabulary Task 3rd Edition (BPVS-III; Dunn et al., 2009) together with the researcher, the caregivers were completing a set of questionnaires. These were the preschool version of the Inventory of Callous-Unemotional Traits (ICU; Frick, 2004), the Childhood Autism Screening Test (CAST; Scott et al., 2002) and the Parent Rating Scales (PRS) of the Behavioral Assessment System for Children (BASC-PRS; Reynolds & Kamphaus, 1992).

4.2.4 Data Analytic Strategy

Normal distribution of all variables was tested using z-tests. All variables but child verbal affect expressions during the I-Love-You task were normally distributed ($-1.96 \geq$ z-scores of skewness and kurtosis ≤ 1.96). Looking at the data itself, it becomes clear that children did not talk very much at all. Hence, child verbal affect has very little variance, and thus, is removed from further analyses to avoid incorrect conclusions.

In sum, the study tested which of the caregiver and child emotional correlates contributes to child callous-unemotional traits the most. To avoid entering too many variables into one multiple linear regression model, two separate models were run in SPSS with child response variables observed during the I-Love-You task entered into one, and caregiver and child emotion understanding variables entered into a second one. Then, a mediational model between caregiver emotion recognition skills

and child's response to their caregivers' affection with child callous-unemotional traits as a mediator was tested. Based on the two prior regression analyses, the mediation model was applied using the PROCESS macro for SPSS (Version 2.13; Hayes, 2013) to test for such indirect effects.

4.3 **Results**

Preliminary Analyses

Table 4.1 shows the descriptive statistics of the main study variables which are children's callous-unemotional traits, emotion understanding and children's

Table 4.1 Descriptives of Main Variables.

	N	***M***	**SD**	**Min**	**Max**	**Skewness z-score**	**Kurtosis z-score**
Child CU Traits	57	16.79	6.67	4.00	29.00	-.74	-1.35
Child EU	48	.06	.39	-.76	.54	-1.57	-1.63
BPVS III	55	103.60	10.09	78.00	120.00	-1.71	-.81
Child Externalising Behaviour	55	49.42	8.58	35	76	2.30	1.22
I-Love-You Task::		.					
Physical Affect	55	7.16	1.69	3.00	10.00	-.19	-.87
Eye Contact	55	6.26	1.26	3.00	9.00	-1.79	.68
Rejection	55	4.12	1.37	2.00	7.00	.24	-.89
Caregiver EU:							
Fear	47	.48	.27	.00	1.00	-.07	-1.01
Sadness	47	.74	.21	.20	1.00	-1.59	-.15
Disgust	47	.55	.28	.04	1.00	-.42	-1.03
Anger	47	.76	.25	.13	1.00	-2.20	-.52

responses to caregivers' expression of affection towards their child as well as caregivers' emotion understanding skills and caregivers' rating of children's externalising behaviour. Main variables were correlated with demographic measures such as child's age, receptive verbal ability (BPVS-III) and autistic-like traits (CAST) as well as caregivers' educational level. Spearman correlations revealed that children's callous-unemotional traits as reported by caregivers were significantly related to lower receptive verbal ability (r_s=-.28, p<.05) as measured using the BPVS-III (Dunn et al., 2009). That is, children who their caregivers rated as high in callous-unemotional traits demonstrated low verbal receptive skills. High levels of callous-unemotional traits in preschoolers were not associated with any of the other demographic variables including the CAST. Further, none of the other main variables such as child responses to caregivers' affection during the I-Love-You task, child emotion understanding as well as caregiver emotion understanding variables were significantly related to demographic variables.

In addition, Spearman correlational analyses among main variables were carried out. Zero-order correlation coefficients revealed that child callous-unemotional traits were significantly and positively related to the caregivers' report on child externalising behaviour (r_s=.54, p<.001) as well as the child responding to their caregiver's affection in a rejecting manner (r_s=.32, p<.05). Child callous-unemotional traits were also found to be significantly and negatively related to the caregivers' emotion recognition skills of sad facial emotion expressions during the emotion recognition task (r_s=-.35, p<.05). However, child callous-unemotional traits was not significantly related to child emotion understanding (r_s=.10, p=.51). Child emotion understanding in general was not found to be related to any of the other main variables. In addition, caregivers' good emotion recognition skills of sad

emotional faces significantly correlated with the child's greater physical affectionate response towards their caregiver (r_s=.35, p<.05), whereas caregiver's good recognition skills of disgust faces significantly correlated with children engaging in more eye contact (r_s=.39, p<.01) with their caregivers during their interaction with them. Finally, caregivers' difficulties in recognising sad and disgusted emotional faces were both significantly associated with their child responding in a rejecting manner towards the caregivers' affection (r_s=-.37, p<.05 and r_s=-.301, p<.05, respectively).

However using the FDR controlling procedure (Benjamin & Hochberg, 1995) and a False Discovery Rate of q=0.05 to account for false discoveries (see CHAPTER THREE for details of this procedure), the adjusted p-level is calculated at p=0.002 ($p_{(1)} = 0.00004 \leq 1*0.05/32 = 0.002$). Therefore, only one association was found to be statistically significant; that is, *high levels of child callous-unemotional traits* were found to be significantly associated with *high levels of externalising behaviour*. See a summary of Spearman's correlation coefficients in Table 4.2 given the corrected significance level.

How do preschoolers with varying levels of callous-unemotional traits respond to the caregivers' expression of affect?

To determine which child response variable significantly predicts child callous-unemotional traits in line with the aims of this study, child response variables such as child eye gaze, physical affect, and child's rejecting response were entered into one multiple linear regression model as predictors. Given that the caregiver-reported externalising behaviour problems as assessed by the BASC-II was

Table 4.2 Spearman's Correlation Coefficients between Child CU Traits, Total Child Emotion Understanding, Child Externalising Behaviour, Child Affect Responses & Caregiver Emotion Recognition for each Emotion

			Child Affect Response		
	Child CU Traits	**Total Child EU**	**Physical Affect**	**Initiating Eye Contact**	**Rejection**
Child CU Traits	-	-	-.083	-.225	.316
Total Child EU	.096	-	.141	.092	-.113
Child Externalising Behaviour	.540*	.023	-.044	-.187	.074
Parent EU:					
Fear	-.090	-.108	.068	.145	-.157
Sadness	-.346	-.016	.345	.185	-.386
Disgust	-.130	.012	.269	.393	-.301
Anger	-.146	.122	.247	.247	-.148

* <.002

significantly and positively related to the caregiver- reported child callous-unemotional traits, scores of the externalising behaviour problem subscale of the BASC-II were also entered as covariates together with BPVS-III normative scores in the first step of the regression. This first step of the regression revealed a significant model in predicting child callous-unemotional traits, $F(2, 49)=10.69$, $p<.001$, adjusted $R^2= .28$. Specifically, externalising behaviour problems was the significant predictor in this initial model, $\beta=.49$, $SE=.10$, $t= 4.13$, $p<.001$, 95%CI = .20 to .58 as expected. Secondly, the inclusion of the child response variables in the next step saw a significant improvement in the regression model, R^2 change=.14, $F(3,46)=3.87$, $p<.05$. The standardised version of the final model is summarised in Figure 4.1.a). It shows that child callous-unemotional traits were significantly predicted by child rejection towards caregivers' affection, $\beta= .71$, $SE=1.23$, $t= 2.95$, $p<.01$, 95%CI =

1.15 to 6.11. Finally after including the child response variables in the main part of the regression model, low BPVS-III scores now significantly predict callous-unemotional traits, β= -.33, SE=.08, *t*= -2.84, *p*<.01, 95%CI =-.38 to -.07, as well as externalising behaviour problems were still significantly associated with callous-unemotional traits, β= .44, SE=.09, *t*= 3.86, *p*<.001, 95%CI = .17 to .53. Therefore, child rejecting response was uniquely and positively related to the measure of child callous-unemotional traits while controlling for child's verbal ability and externalising behaviour problems.

Is caregivers' understanding of emotions associated with their children's callous-unemotional traits?

Next, associations between caregivers' emotion understanding skills, child emotion understanding and child callous-unemotional traits were investigated. For this purpose, all corrected caregiver recognition accuracy scores which assessed the caregivers' understanding of negative emotional faces (disgust, sadness, fear and anger) were entered into one model together with child emotion understanding to predict child callous-unemotional traits. In line with the previous model, scores of the externalising behaviour problem subscale of the BASC II and the child's BPVS III normative scores were entered as covariates in the first step of the model. The first step of the regression resulted in a significant model in predicting child callous-unemotional traits, F(2, 36)=5.96, p<.01, adjusted R^2= .21. Similarly to the previous model, child callous-unemotional traits was significantly predicted by externalising behaviour only, β=.49, SE=.09, *t*= 4.13, *p*<.001, 95%CI = .20 to .58. The addition of

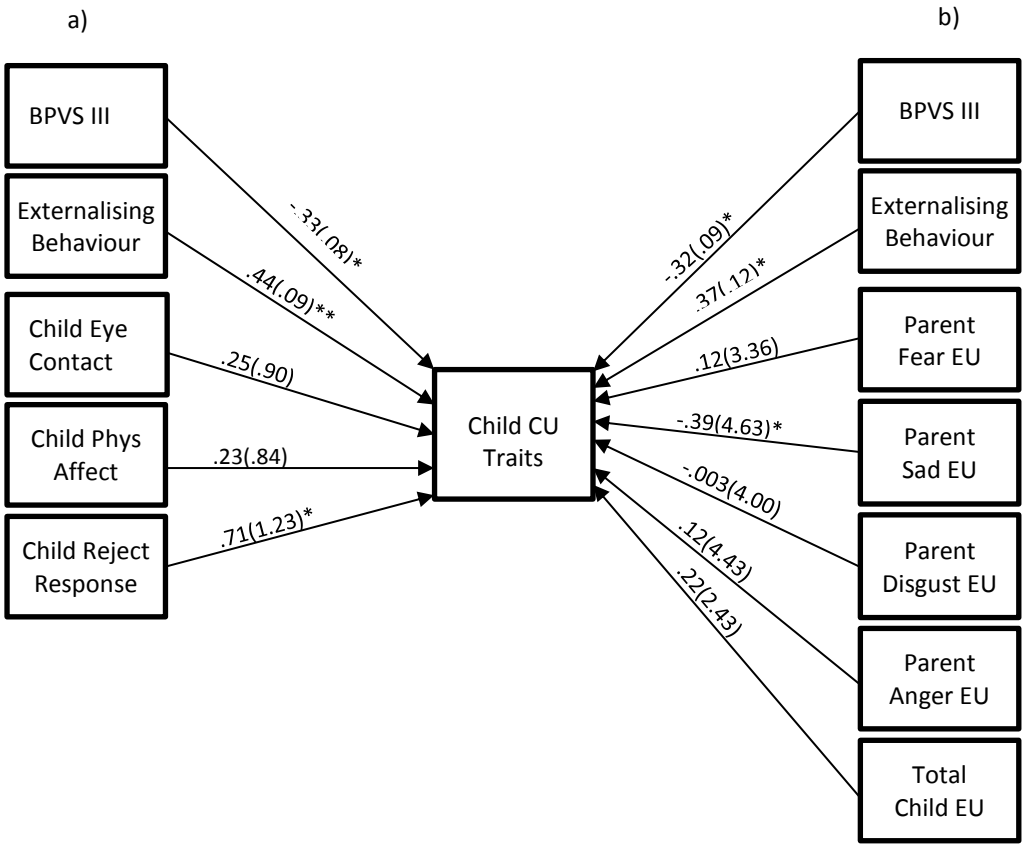

Figure 4.1 Standardized solution of betas (SE) in two multiple linear models of child callous-unemotional traits regressed on a) Child Affect Responses and b) Caregiver Emotion Recognition Variables and Total Child Emotion Understanding. Note: *p < .05, **p<.001.

the caregiver's facial emotion recognition accuracies and child emotion understanding in the next step did not result in a significant improvement of the model, R^2 change=.18, F(5, 31) = 1.94, p=.12. However, this final model showed caregivers' accuracy for sad faces was the only significant predictor of child callous-unemotional traits, β= -.39, SE=4.63, t= -2.54, p<.05, 95%CI = -21.17 to -2.30. The standardised version of the final model is summarised in Figure 4.1.b). Finally after including emotional faces and child emotion understanding in the model, externalising behaviour was still significantly associated with child callous-

unemotional traits, β= .37, SE=.12, *t*= 2.66, *p*<.05, 95%CI = .08 to .58, and BPVS III scores just reached significant association with child callous-unemotional traits, β= -.32, SE=.09, *t*= -2.12, *p*<.05, 95%CI = -.38 to -.01. Therefore, caregivers' inability to recognise sad facial expressions and child emotion understanding were negatively related to the measure of child callous-unemotional traits, which was also uniquely related to greater levels of externalising behaviour and reduced child verbal ability.

Table 4.3 Model Coefficients of Mediation (indirect effect) of the Association between Caregiver Recognition of Sad Facial Expressions and Child Rejecting Response via Child Callous-Unemotional Traits.

		Consequent						
		M				**Y (Child Rejecting Response)**		
Antecedent		**Coeff.**	***SE***	**p**		**Coeff.**	***SE***	**p**
X (CAREGIVER SAD EU)	a	-9.664	4.157	<.05	c'	-1.447	.834	.087
M (Child CU Traits)		-	-	-	b	.069	.029	<.05
Constant	i_1	44.736	9.570	<.001	i_2	-.020	2.196	.993
		R^2=.196				R^2=.272		
		F(2,43)=5.253, p<.01				F(3,42)=5.236, p<.01		

Do children with high callous-unemotional tendencies reject their caregivers' affection based on poor parental emotion understanding?

To answer the question of whether young children with elevated levels of callous-unemotional traits respond in a rejecting manner because of their caregivers' difficulties of emotion understanding, specifically sad facial expressions, a mediation model tested the indirect effect between caregivers' sad emotion recognition skills and the children's rejecting response via child callous-unemotional traits. A summary of this mediation model is presented in Table 4.3. and Figure 4.2. Normative BPVS-III scores were entered into this model as well to control for child

verbal abilities. As shown, children whose caregivers had difficulties in recognising sadness from others' static facial expressions were also rated as high in callous-unemotional traits (a=-9.66, p<.05). Also, children who were rated as high in callous-unemotional traits by their caregivers showed heightened rejection towards their caregivers' affection (b=.02, p<.05). Further, this mediation model showed a significant indirect effect between caregiver emotion recognition skills of sad emotional facial expression and child rejecting response (ab=-.19). This was evident as bias-corrected bootstrap confidence intervals based on 5,000 bootstrap sample was found to be completely below zero (-.43 to -.04). Hence, caregiver's poorer recognition skills of sad facial expression were related to children responding to their caregiver's affection in a rejecting manner because of high callous-unemotional traits in children. In addition, when entering externalising behaviour problems as another covariate into the current mediation model, the indirect effect disappears suggesting that it is child callous-unemotional traits that uniquely explains the association between impaired caregiver's sad recognition and child rejecting response.

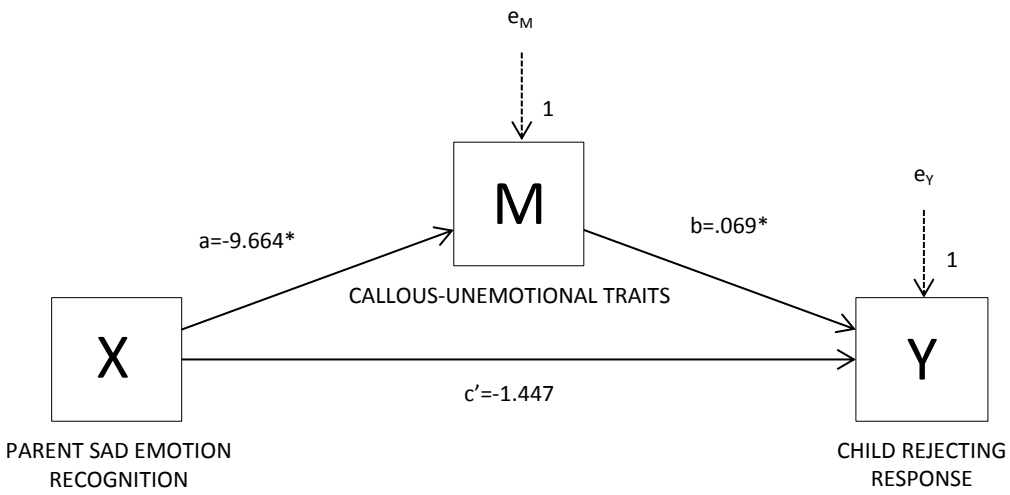

Figure 4.2 Mediation Model between Caregiver Sad Emotion Recognition and Child Rejecting Response via Child Callous-Unemotional Traits. Note: *p<.05

4.4 **Discussion**

Previous research associated a lack of emotional engagement with caregivers, specifically eye gaze (Dadds et al., 2014), with emotion understanding impairments in children with high levels of callous-unemotional traits (Dadds et al., 2011). This is consistent with the idea that a child's temperament matters in the way he or she responds to his or her environment (Kochanska, Kim, Boldt, & Yoon, 2013; Pasalich, Dadds, Hawes, & Brennan, 2011; Pasalich, Witkiewitz, McMahon, Pinderhughes, & Group, 2015). In addition, the present research is the first to examine the role of caregivers' own emotion understanding skills underlying the association between child callous-unemotional traits and child verbal and non-verbal response to the caregivers' affection. In sum, the current results support that children with elevated levels of callous-unemotional traits form a distinct group of children even at the age of three to five years who show a lack of emotional engagement towards their caregiver's affection, but no impaired emotion understanding. Furthermore, the findings indicate that this group of children is affected by caregivers' levels of emotion understanding that is specific to sad facial expressions. The following will discuss these findings in more detail.

The present study supported previous findings that children with elevated levels of callous-unemotional traits show a lack of attention to and engagement with (Dadds et al., 2014; Dadds et al., 2011; Kimonis et al., 2016; Kimonis et al., 2007; Pasalich et al., 2012) and lack of concern for other's feelings (White et al., 2016). In the present study, children who were rated as high callous-unemotional traits responded to their caregiver's affection in a dismissive manner. However, the child's rejecting response as found in the present study was not solely related to reduced eye

gaze or physical affect as expected based on previous research, but reflected a combination of the two. Present findings suggest that the unwillingness in children with high callous-unemotional traits to engage and respond to others such as their caregivers' affection comes before an impaired emotion understanding. This is supported by previous research, which suggested that mutual responsive and positive interaction between caregivers and children is essential for successfully scaffolding children's development of emotion understanding (Kochanska, Kim, & Boldt, 2013; Kochanska, Kim, Boldt, & Yoon, 2013). Mutual responsiveness, in turn, is dependent on caregiver and child paying attention to each other specifically involving mutual eye gaze (MacLean et al., 2014). Hence, previous research has found reduced eye gaze in children with high levels of callous-unemotional traits to be a particularly important indication that they do not pay enough attention towards their caregiver in order to engage with him or her in a sensitive and positive manner (Dadds et al., 2011). However, there are other ways caregivers can get the attention of their child involving verbally requesting the child's attention as well as non-verbally through touch (Estigarribia & Clark, 2007). These have been mostly ignored in relation to child callous-unemotional traits. The present research supports a holistic view where children with high callous-unemotional traits may not pick up on attentional cues which are not important to them and which are not limited to eye gaze (Dawel et al., 2015).

Furthermore, the current study is the first to examine both the children's as well as caregivers' emotion understanding taking into account the child's callous-unemotional traits. One aim of present study was to identify whether caregivers of children with high callous-unemotional traits display difficulties recognising emotion expressions similar to the emotion understanding impairment found in

children and adolescents with high callous-unemotional traits in previous research (Blair, 1999; Blair et al., 2001; Centifanti et al., 2016; Dadds et al., 2008; Dadds et al., 2006; Marsh et al., 2008). Findings revealed that caregivers' skills to recognise sadness in other's faces were related to their children's heightened levels of callous-unemotional traits. Hence, children whose caregivers demonstrated difficulties labelling sad facial expressions correctly were rated by their caregivers as high in callous-unemotional traits.

There are two pathways that can explain the association between impaired sad recognition in caregivers and child callous-unemotional traits. First, the lack of empathy characteristic of callous-unemotional traits in children and adolescents (Blair, 1999; Blair et al., 2001; Kimonis et al., 2007) originate in a learned process that involves their very early emotional environment and social interactions. That is, caregivers who have difficulties understanding others' distress correctly and responding in an empathic manner may not be able to teach those skills to their child (Pasalich, Waschbusch, Dadds, & Hawes, 2014). Children with callous-unemotional traits may be particularly vulnerable to their caregivers' impairment to read sad facial expressions accurately based on their temperament. Second, callous-unemotional traits were found to be heritable (Viding et al., 2005; Viding et al., 2013). Previous research has found an impairment to identify sad emotional cues in other faces as symptomatic for the affective component of adult psychopathy and was linked to a lack of empathy (Blair et al., 2001; Dolan & Fullam, 2006; Hastings, Tangney, & Stuewig, 2008; James Richard Blair, Jones, Clark, & Smith, 1997). Caregivers' difficulties to accurately recognise sad facial emotion expressions may be an indication of callous-unemotional traits in the caregivers. The interplay of both pathways, namely heritability and environment, may particularly disadvantageous

for these children. However, because a small number of caregivers in the present study were not the biological caregivers of the children, heritability did not play a role for every child. Therefore, children with callous-unemotional traits are not immune to the influence of their early environment (Crum, Waschbusch, Bagner, & Coxe, 2015). Instead, the manifestation of callous-unemotional traits in the children's behaviour can vary dependent on caregiving experience (Dadds, Cauchi, et al., 2012; Humphreys et al., 2015; Pasalich et al., 2015) and caregivers' emotion understanding.

There is a further reason for this association specific to the caregivers' impaired sad recognition. People expressing sadness tend to send out a signal that they need help or comforting (Camras, 1977), which tend to inhibit harmful behaviour from others. This is in accordance with the Violence Inhibition Mechanism (Blair, 1995; Lench, Tibbett, & Bench, 2016). In the present study, when caregivers incorrectly labelled sadness, they predominantly mislabelled this emotion expression as disgust. In comparison to sad expressions, an approach-orientated emotion expression (Lench et al., 2016), disgust expressions can be seen as avoidant-orientated emotion expressions that send out signals of social rejection and tells others to stay away (Marshall & Holtzworth-Munroe, 2010). Caregivers seem to misinterpret their child's emotion expression and thereby fail to identify their children's expressions of sadness. Instead, these caregivers interpret their children's response as rejecting and cold. In turn, caregivers respond in a dismissive manner towards their child preventing caregiver and child to establish a mutually responsive and warm relationship (Pasalich et al., 2014). Given that callous-unemotional traits are particularly vulnerable to risk factors such as ineffective caregiving and harshness (Waller et al., 2012), caregivers' dismissive and negative response that is

insensitive to the children's emotional states and needs, such as wanting to be comforted when in distress, can exacerbate callous-unemotional traits.

The present findings also revealed an indirect link between caregivers' difficulties to label sad emotion expression correctly and the child's rejecting response towards their caregivers' affectionate behaviour. This association was explained by elevated levels of child callous-unemotional traits. This suggests that as caregivers who could not identify sad emotion expression and is more likely to respond to their children in an insensitive manner, those children with high levels of callous-unemotional traits also respond in a dismissive manner to the caregivers' affection. Similar to the theory of coercive family dynamics (Reid & Patterson, 1989; Smith et al., 2014) which describes the process of sustaining and exacerbating children's behaviour problems as well as negative and unresponsive caregiving experience through mutual reinforcement. Whereas the children's rejecting response in the present study cannot be defined as a behaviour problem, the children's response reinforces caregivers' negativity. This cycle means that even though children with elevated levels of callous-unemotional traits are responsive to the caregivers' warmth, the quality of the caregiver-child relationship is damaged and these children respond negatively to the caregivers' affection expression. A bi-directional effect was found for child callous-unemotional traits in previous research (Hawes et al., 2011) where caregivers' insensitive responding and ineffective rearing style is a risk for maladaptive outcomes for these children. However on the other hand, maladaptive behaviour presented by children with callous-unemotional traits creates a challenge for the caregivers' rearing of these children (Kochanska, Kim, Boldt, & Yoon, 2013).

Finally in contrast to expectations, children with elevated levels of callous-unemotional traits at the age of three to five years did not demonstrate impaired emotion understanding. This is inconsistent with prior research which revealed difficulties recognising negative emotions such as fear and sadness in children as young as three years old (Kimonis et al., 2016; White et al., 2016) as well as older children (Dadds et al., 2008; Dadds et al., 2006) who were rated as high in callous-unemotional traits. These unexpected results can be explained by the fact that reports of a specific impairment in emotion recognition have been inconsistent across different studies (e.g. Wolf & Centifanti, 2014) including no impairment at all (Glass & Newman, 2006; Richell et al., 2003). In addition, a failure to replicate an association between child callous-unemotional traits and lack of emotion understanding in the present study while an association was found between child callous-unemotional traits and the caregivers' impaired sad recognition accuracy is intriguing in itself. That is, findings here give an indication that children's later emotion understanding impairment start already in their caregivers' own impairment in recognising distress emotions in others.

One of the main limitations of this study is that apart from the experimental tasks, ratings of child behaviour and callous-unemotional traits were solely dependent on caregiver-reports. Future research should include teacher reports ratings of child behaviour and personality traits within the context of a group of the children's peers and the context of the teachers' more general knowledge and experience of child development (Crum et al., 2015). A further methodological limitation includes the fact that caregivers' empathy or callous-unemotional traits were not assessed. However, there is a substantial amount of research which confirms problems with sad recognition

associated with psychopathic traits and a lack of empathy (Blair et al., 1997; Blair, 1999; Blair & Coles, 2000). A concrete measure of caregivers' empathy or callous-unemotional traits was not included as an assessment of emotion understanding was considered good indices and to avoid caregivers and child loosing attention. Further, the sample was homogenous since the present study was conducted in the North East of England. For the purpose of creating interventions with families, they need to be shaped to the specific needs and characteristics of the community the individuals live in. Therefore, the present findings may be of advantage when it comes to informing interventions in the North East of England, which limits the generalisation of the present findings. Finally, the current sample who were recruited from a non-referred population of families differed to that from previous research (Dadds, Allen, et al., 2012). This may have presented a problem of a less varied distribution within callous-unemotional traits in comparison to the clinically referred samples of previous research. However, present findings were in line with those of referred samples. The recruitment of a non-referred sample even presents a strength of the present research. That is, children and their caregivers were not recruited based on already existing child behavioural problems which may suggest greater variance within child behaviour.

4.5 **Summary**

In summary, the present results do not support previous research that young children at the age of 3 to 5 years old with elevated levels of callous-unemotional traits display impaired emotion understanding. Additionally, the current study did not confirm reduced eye gaze which is thought to underlie impaired attention to

distress cues for which attention to others' eye regions was thought important (Dadds et al., 2011). Instead, children with high callous-unemotional traits displayed a lack of emotional engagement with their caregivers which is reflective of reduced eye gaze and physical contact combined. These results support a selective attention hypothesis (Baskin-Sommers et al., 2011; Dawel et al., 2015) which implies that callous-unemotional individuals have difficulties shifting attention to environmental cues, such as the caregivers' affection in the present research, when that is not important to them.

Caregivers of children with high levels of callous-unemotional traits also exhibited emotion understanding impairment that was specific to sad expressions in others. It is unclear whether this is due to a heritable influence of callous-unemotional traits across generations or whether caregivers' own difficulties to accurately identify someone else in distress may have a negative impact on the way they interact with the children. This may be because caregivers misinterpret their children's distress as rejection, and may respond in an insensitive manner. What is clear is that the caregivers' impaired identification of sad expressions has a negative impact on the way children with high callous-unemotional traits respond to their caregivers. Potentially, this is because of negative caregiving experience which supports a theory that children with callous-unemotional traits are specifically vulnerable to negative and ineffective rearing environment (Pasalich et al., 2014; Waller et al., 2013). Finally, present findings also suggest that emotion understanding problems which are associated with a lack of empathy in callous-unemotional traits and which are thought to underlie distinct pattern of antisocial behaviour start in the caregivers.

CHAPTER FIVE: GENERAL DISCUSSION AND FINAL CONCLUSION

5 A Synopsis of the Combined Studies

The motivation of social behaviour when interacting with others is founded in the ability to experience empathy towards others (De Waal, 2008); that is the ability to recognise and experience others' emotional states such as happiness or distress. Therefore, empathy is dependent on sensitivity and understanding of how others might feel. Because the ability to understand another person's emotions is the first step towards empathy, the concept of emotion understanding has been extensively researched in relation to the development of social competence (e.g. Denham, 2007; Halberstadt, Denham, & Dunsmore, 2001) and the occurrence of externalising behaviour in children and adolescents (Frick & White, 2008; Kochanska et al., 2008). Therefore, the present thesis engaged in two lines of enquiries, namely impairments in emotion understanding associated with callous-unemotional traits and parental support of the development of their children's emotion understanding. The following will present a synopsis of the main findings in this thesis.

5.1.1 Impairment of Emotion Understanding in Callous-Unemotional Traits

Specifically, the present thesis considered instances where a lack of empathy is associated with severe and continuing antisocial behaviour such is the case in adolescents with high callous-unemotional traits (Frick, Cornell, et al., 2003; Frick, Kimonis, et al., 2003; Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007).

One focus of this thesis is on impairment found in adolescents with high callous-unemotional traits specific to the recognition of fearful or sad emotional expressions in faces and postures in line with previous research (Blair et al., 2001; Dadds et al., 2008; Dadds et al., 2006; Kimonis, Frick, Munoz, & Aucoin, 2008). In Study 1, the hypothesis tested was that adolescents, when experiencing difficulties recognising expressions of sadness and fear, fail to modify their behaviour to respond sensitively towards others. In summary, results point to a broad impairment for processing negative emotions in adolescents high in CU traits including expressions of painful faces and angry body expressions, but not sad or fearful expressions. Given that the sampling of adolescents from short stay schools was done with the intention to oversample adolescents with higher levels of callous-unemotional traits, findings are generalisable to adolescents who demonstrate higher and consistent levels of antisocial behaviour than found in a typical community sample, and who may be at risk of further offending. Hence for antisocial adolescents specifically, the first study suggested that callous-unemotional traits are the basis for the inability to read others' negative emotional states in general and may underlie their antisocial behaviour. This was in contrast to the hypothesis and may be further support for a selective attention hypothesis of callous-unemotional traits.

5.1.2 Parental Scaffolding of Child Emotion Understanding and Responsiveness in Callous-Unemotional Traits

Having identified the importance of emotion understanding for social behaviours, the way parents can scaffold their young children's emotion understanding from early on was investigated next in Study 2. Previous research confirmed that scaffolding children's emotion understanding is characteristic of

parents helping their child to focus on emotion expressions and experience when parents and children interact with each other. Parents provide a social framework supporting children to learn and practice their emotion understanding (Hammond & Carpendale, 2015). Given previous research, it was expected that increased mutual eye gaze (MacLean et al., 2014) when parents express their love towards the child as well as parents' comments about the emotion states and intents of characters during joint story-telling (e.g. Taumoepeau & Ruffman, 2006) would contribute to the child's emotion understanding in Study 2. It was also expected that parental scaffolding is dependent on parental levels of emotion understanding. The results suggested that the parents' own level of emotion understanding is the basis for parental scaffolding specifically mutual eye gaze. However, results of the current study did not confirm that the children benefit from parental scaffolding. Instead, child emotion understanding was lower as a result of prolonged locked mutual eye gaze and parents' greater emotion understanding skills of negative emotion expressions. In addition, findings should be considered within the context and sample they have been examined. The community sample of caregivers and children in Study 2 was representative of the population of the North East of England with a predominantly White-British background. However, the families who were recruited varied greatly in regards to their socio-economic backgrounds. Families were either contacted through their school or nurseries some of which were based in more deprived areas within County Durham. Other families were contacted via a database of parents who have shown appreciation with a connection to academia and who have shown interest in getting involved in research before. Within such a community sample of caregivers and their children, findings suggested that although parents may provide an optimal environment for the child to learn about emotions, the children's

response to parental scaffolding efforts may not be optimal.

It is mutual responsiveness between parents and child that matters (Kochanska, Kim, & Boldt, 2013). Additionally, the child's response to parental scaffolding may be dependent on the children's temperament (Hastings et al., 2007; Kochanska, Kim, Boldt, & Yoon, 2013) as demonstrated by the finding that callous-unemotional traits in children are associated with an insensitivity to parental communication of affection (Dadds et al., 2014; Dadds et al., 2011). Such an insensitivity specifically concerns reduced eye gaze towards their parents. Hence in Study 3, a similar pattern in young children aged 3 to 5 years with high levels of callous-unemotional traits was hypothesised as well as difficulties in emotion understanding (Centifanti et al., 2016). In sum, Study 3 was not able to replicate findings that children between the age of 3 to 5 years with high callous-unemotional traits demonstrated impaired emotion understanding as assessed by the AKT (Denham, 1986). Instead, findings supported the expectation that young children high on these traits show reduced sensitivity to parents' expression of affection. Additionally, their insensitivity was not limited to, but a combination of reduced child's eye gaze and physical affect towards their parents. Present findings also revealed that child callous-unemotional traits were based on the parents' own difficulties to recognise sad facial expressions from others faces. In conclusion, parental emotion understanding skills, specifically in regards to another person's distress, determine the responsiveness to parents' affection in children with high levels of callous-unemotional traits. The expectation that children's sensitivity to parental affection is dependent on the child's temperament such as callous-unemotional traits was supported. In addition given that callous-unemotional traits in Study 3 were considered within the community sample described in Study 2, these

findings can be generalised to children who demonstrate higher levels of callous-unemotional outside the context of problem behaviour and social maladjustment. This is in contrast to previous research that involved children who were referred for early problem behaviour (Dadds et al., 2014; Dadds, Allen, et al., 2012). The present findings will further be discussed in terms of methodological limitations as well as potential intervention and treatment methods for child emotion understanding when callous-unemotional traits are present.

5.2 Theoretical Implications

5.2.1 Child Emotion Understanding and Child Callous-Unemotional Traits – Child Level

Given that good levels of emotion understanding are pivotal for developing social competence (Denham, 2007; Trentacosta & Fine, 2010), impairment in emotion understanding, specifically fear and sadness, is thought to underlie severe antisocial behaviour associated with callous-unemotional traits in children and adolescents (Blair & Coles, 2000; Blair et al., 2001). This association has been attributed to reduced threat processing (e.g.Viding, Fontaine, & McCrory, 2012) which is based on a fearless temperament (Larson et al., 2013; Lykken, 1957). In other words, individuals with callous-unemotional traits do not recognise others' distress as a threat and aversive cues which need to be avoided (Finger et al., 2011; Finger et al., 2008). Fear processing, therefore, has received much attention in previous research supported by other research identifying a lack of eye gaze associated with callous-unemotional traits. This section of this chapter will take the

view that a model of emotion processing impairment limited to fear does not present a complete picture of how children and adolescents process their emotional environment. In order to demonstrate this, the following will begin by discussing present findings in relation to an alternative model revolving around selective attention. Following this, the findings will be discussed in relation to the lack of emotional engagement with their environment during early childhood as a possible support for a selective attention hypothesis.

No Specificity to Fear for Callous-Unemotional Traits?

Fear as an avoidant-orientated emotion is seen to be important in the literature of empathy (Blair et al., 2001); that is, the fear expressed by another person acts as an aversive or threat-related expression which signals a possible harm or punishment-contingent outcome for the other person or oneself. In addition, accurate identification of fear expression is associated with prosocial responding (Marsh et al., 2007). Sadness (Rigato & Farroni, 2013) as well as pain expressions (Craig, 2009; Craig, Versloot, Goubert, Vervoort, & Crombez, 2010) have a similar effect to fear as an avoidant-orientated emotion expression. The emotion dysfunction hypothesis associated with callous-unemotional traits in children and adolescents suggests an impairment in identifying fear and sadness based on a lack of vicarious experience when viewing others in distress (e.g. Blair, 1999; Blair et al., 2001). In addition, identification of pain expressions in others also relies on understanding and sharing in another person's pain experience (Craig, 2009) suggesting that adolescents with high callous-unemotional traits would show a similar impairment for pain expressions consonant with the emotion dysfunction hypothesis. However, contrary to expectations, the present research on adolescent males did not

demonstrate specific impairments in fear and sadness recognition, whereas an impairment was extended to other negative emotion expressions, namely pain. Therefore, present findings partly support a model of emotion dysfunction that is specific to impaired distress identification. However, a failure to replicate an impairment to identify fear or sadness also implies that such a model of emotion dysfunction which is limited to impaired fear and sadness processing is not exhaustive.

Support that callous-unemotional traits have been associated with reduced processing of specific emotions has not been consistent across research and include impaired recognition of disgust faces (Kosson et al., 2002; Sylvers et al., 2011), angry expressions (Muñoz, 2009), atypical response to pain expressions observed in others (Decety, Michalska, & Akitsuki, 2008) and reduced processing of general distress stimuli (Kimonis et al., 2007). Instead, a failure to shift attention to important environmental cues such as negative emotions may account for an emotion processing impairment that is not exclusive to fear and sadness, but may support a theory of selective attention to emotion stimuli in general (Baskin-Sommers et al., 2011). The present thesis does not support a specific role of impaired fear processing within the concept of callous-unemotional traits, but a general lack of emotional engagement with the emotional environment.

Typically, emotions are reactions to situations and people, and negatively valenced emotion expressed by others are often an expression that the current situation does not match their desired outcome (Lench et al., 2016). For instance, the expression of sadness is thought to follow the failure of achieving the desired outcome without the possibility of attainment given the current skills or situation. Similarly, the expression of anger is thought to follow a failure of outcome for which

attainment of the desired outcome is possible once obstacles are removed (Lench et al., 2016). Both emotion expressions signal to other people that a change in behaviour or situation is needed to overcome the current situation and attain the desired outcomes. For a change of behaviour to occur, the observer needs to pay attention to the other's negative emotion expression. Consistent with selective-attention hypothesis (Baskin-Sommers et al., 2011), individuals with high callous-unemotional traits fail to pay attention to another person's negative emotion expressions because the other's goals and desires are not in their line of attention.

The selective-attention hypothesis suggests that if top-down goal-directed attention does not focus on salient bottom-up and task-relevant cues such as other's negative emotion expressions, attention to such aversive cues is not reallocated. It is attention that enables emotional processing of facial expressions (Pessoa, McKenna, Gutierrez, & Ungerleider, 2002). Previous research has demonstrated that activation of brain structures such as the amygdala was involved in mediating attention to and in processing fearful and sad facial expressions. Therefore, a hypo-activation of the amygdala associated with callous-unemotional traits was thought to underlie an impairment in fear and sadness identification (Adolphs & Tranel, 2004; Blair, 2007; Jones et al., 2009; Marsh et al., 2008). However, recent research has pointed out that an underactivation of the amygdala when individuals with high callous-unemotional traits view another person's distress cues may not be consistent finding across research (Carré, Hyde, Neumann, Viding, & Hariri, 2013). Instead, the activation of the amygdala may be modulated by focus of attention to such distress cues (Larson et al., 2013; White, Marsh, et al., 2012). In previous research, when adolescents with low levels of callous-unemotional traits were processing fearful faces while being distracted with another cognitive task, i.e. high cognitive load condition, amygdala

response was reduced in comparison to the absence of distractions, i.e. low load condition. In contrast for adolescents with high callous-unemotional traits, amygdala response for both conditions did not differ, but instead resembled that of the high load condition for typically developing adolescents (White, Marsh, et al., 2012). Such evidence suggests a lack of attention to other's negative emotional facial expression and a reduced processing thereof with no specificity to fear or sadness. Indeed, children and adolescents with callous-unemotional traits show less preference to attend and explore facial expressions in general (Bedford, Pickles, Sharp, Wright, & Hill, 2015; Boll & Gamer, 2016; White, Williams, et al., 2012). These findings may be considered as the basis for their lack of response and engagement with their environment such as another person's emotional state.

No Specificity to Reduced Eye Gaze for Callous-Unemotional Traits?

Since the present findings did not support a theory of emotion dysfunction that is limited to fear, these findings also suggest that a previously found reduced eye gaze indicates part of a more general impaired attentional cueing mechanism predicting inaccurate processing of facial expression (Dawel et al., 2015; Estigarribia & Clark, 2007; Rigato & Farroni, 2013). In addition, young children with callous-unemotional tendencies exhibited a much broader lack of affectionate engagement including reduced physical contact. This is not consistent with previous research which showed that young children with callous-unemotional tendencies demonstrate reduced affectionate engagement with their parents, specifically reduced eye gaze (Dadds et al., 2014; Dadds et al., 2011). Given that attention to the eyes is important for identifying fear in others' faces (Gamer & Büchel, 2009), a theory that attributed reduced attention towards another person's eyes to impaired emotion processing in

children with high callous-unemotional traits, specifically fear processing, was suggested (Dadds et al., 2008). However, present findings support a theory that it is not just about the eyes (Dawel et al., 2015) as previously suggested (Dadds et al., 2014; Dadds et al., 2008; Dadds et al., 2011). This idea is supported as individuals with high callous-unemotional traits in previous research demonstrated similar reduced attentional cueing for arrows pointing to salient stimuli in addition to gaze direction (Dawel et al., 2015). In fact, focusing exclusively on reduced eye gaze in children with callous-unemotional traits may limit our understanding how these children engage with their emotional environment too early.

Parents can draw and maintain their children's attention in different ways in order to interact with the child. Direct eye gaze towards their child can function as an important attentional cue helping to identify facial emotion expressions (Ganel et al., 2005), but does not convey intent (Lee et al., 1998). In addition to parental eye gaze (Taylor et al., 2001), parents can also cue their child's attention using physical touch or verbally inviting them to attend (Estigarribia & Clark, 2007) which is especially important when eye contact is not possible (Koester, Karkowski, & Traci, 1998). A lack of responsiveness towards parental affection by children with callous-unemotional traits as demonstrated by the present research may be considered as a failure to get the child's attention. These children may miss such attentional cues as they may not be a central aspect of their goal-directed focus of attention (Baskin-Sommers et al., 2011; Dawel et al., 2015). Therefore, present findings of a lack of responsiveness by young children with high callous-unemotional traits towards their parents' affection, such as physical touch, may be further support for a selective attention hypothesis.

Criticism of the selective-attention hypothesis (Baskin-Sommers et al., 2011; White, Marsh, et al., 2012) pointed out, however, that even for goal-relevant information, children with callous-unemotional traits showed impairment in attending to fearful expressions only if they were not directed to do so (e.g. Dadds et al., 2008). These findings suggest that there are still aspects of this selective attention theory which are not understood. In addition, it was suggested that individuals with high levels of callous-unemotional traits recue their attention by actively avoiding negative emotion expressions. Some research found that individuals with high levels of callous-unemotional traits display an increased and prolonged focus on positive stimuli when in a bad mood (Yoon & Knight, 2015) thereby actively avoiding empathic distress (Chikovani, Babuadze, Iashvili, Gvalia, & Surguladze, 2015). Further, the focus of attention to emotion expressions may dependent on the context and the person expressing emotions, e.g. attachment-related emotions. For instance, children with high levels of callous-unemotional traits responded to emotions expressed by persons or story characters they feel connected to (Dadds et al., 2015). Thus, through an attachment with the person who expresses the emotion, such expressions may become relevant. More research is needed here on attachment in relation to callous-unemotional traits to allow further discussion. However, if emotion processing of emotional expression conveyed by an attachment figure would have such an effect, this may suggest support for a theory of selective attention that is driven by an emotional attachment.

Finally, there are further problems with both, the emotion dysfunction hypothesis and the selective attention hypothesis. Neither of the theories account for the complex process when identifying another person's emotional state. For instance, evidence supporting these theories is based on emotional stimuli which are often

presented as isolated emotion expressions. Previous research has shown that emotional experience can overlap even for opposite emotions (Larsen & McGraw, 2011; Larsen, McGraw, & Cacioppo, 2001; Reissland, 1985). Emotion expressions in others can change quickly as a response to the social context and can appear as merging together. So, emotion processing during real-life interactions with others occurs as multi-layered processes involving a continuous and simultaneous encoding and decoding of others' and own emotional messages (Kappas, 2013). In addition, emotion processing is regulated through top-down goal-directed attention to bottom-up salient emotional cues (Kappas, 2013; Kuhn & Tipples, 2011; Larson et al., 2013). Given a dynamic, complex and fast-pace automatic processing of emotional cues, our insight into the emotion processing of children and adolescents with high levels of callous-unemotional traits may be confined by the current stimuli used in research accounting for some of the inconsistencies across research. Additionally, a theory that combines both hypotheses and recognises an interplay between attention and emotional processes may present a more complete picture of emotion processing associated with callous-unemotional traits than each hypothesis alone as both attention and emotional processes are not independent of each other (Baskin-Sommers et al., 2011, 2013; Larson et al., 2013).

5.2.2 **Parents' Scaffolding of Children's Emotion understanding with Callous-Unemotional Traits – Parent Level**

Parents' own skills of emotion understanding may be important for scaffolding emotion understanding in typically developing children for two reasons: first, children look to their parents for social referencing; that is, they look to their

parents for information about how to label and respond to their environment (Morris et al., 2007). Therefore, parents' inaccurate understanding of emotional events and stimuli in the environment may be misleading for their children when they come to labelling their emotional environment. In other words, parents' impaired emotion understanding prevents them from teaching their child about accurate emotion understanding. Second, parents' understanding of how emotions function and are managed determine the way parents interact with their child on an emotional level (Morris et al., 2007). Specifically, when parents are able to read and accurately interpret their children's emotional cues, they can empathise with and respond to their child in a more sensitive manner than if parents perceive their child as unreadable and unpredictable which is connected to parents feeling helpless and a sense of failure to understand their child (Goldberg, 1977). When parents are able to respond sensitively to their children's need and emotions, children are also more likely to respond in kind (Kochanska et al., 2008; Kochanska, Forman, Aksan, & Dunbar, 2005). Hence, parents' own emotion understanding can contribute to the quality of their relationship with their child (Wolff & Ijzendoorn, 1997). In addition, parents often regulate time and place for their child to learn about emotions (Morris et al., 2007). Parental sensitivity towards their children's emotional state and needs can help the parents choose suitable opportunities for when their child may be most receptive to parental guidance.

Given that present findings showed that parents of young children with high levels of callous-unemotional traits displayed impaired abilities to process distress in another person's facial expressions, the following will argue that parental levels of emotion understanding may be especially important for their children with high callous-unemotional traits. Parents' ability to read emotional cues displayed by their

child accurately may be important as parents are able to adapt behaviour to engage their children's attention, and scaffold their children's emotion understanding, which are crucial aspects for children with high levels of callous-unemotional traits (Centifanti et al., 2015). Impaired distress processing in parents of children with callous-unemotional traits also predicted a lack of the children's emotional engagement with the parents. There are different mechanisms that are considered in the following to explain these findings. First, previous research has discovered that callous-unemotional traits are heritable (Blonigen, Hicks, Krueger, Patrick, & Iacono, 2005; Viding et al., 2005; Viding, Jones, et al., 2007). Given that parents of these children show an impaired emotion processing that is similar to the impairment found in children and adolescents with high levels of callous-unemotional traits in previous research (e.g. Blair et al., 2001), the current research supports the idea of heritable influence on temperamental traits between parents and their children (Hawes et al., 2011) which may also put the child at further risk of maladaptive outcomes rather than steer him or her off such a trajectory. Second, present findings may also point to a parent-driven social effect on the children. In other words, parental insensitivity to child affective cues can result in ineffective parenting. In addition, consistent with the diathesis stress model (Belsky & Pluess, 2009), young children with high callous-unemotional traits are specifically vulnerable to ineffective parenting which in turn puts the child at risk of maladaptive outcomes (Pardini et al., 2007; Wootton et al., 1997).

Parent-Driven Effect on Child Responsiveness

Ineffective parenting characteristic of a harsh and inconsistent parenting style can influence the development of maladjusted outcomes in children with high

callous-unemotional traits (Pardini et al., 2007; Wootton et al., 1997). Indeed, ineffective parenting is related to greater levels of callous-unemotional traits (Frick, Kimonis, et al., 2003; Waller et al., 2012) and greater levels of conduct problems for children with callous-unemotional traits (Wootton et al., 1997). Whereas ineffective parenting poses a risk for children with callous-unemotional traits, parental warmth (Pasalich et al., 2015; Waller et al., 2014) and responsiveness (Humphreys et al., 2015; Kochanska, Kim, Boldt, & Yoon, 2013) can offset such a risk. Specifically, the most effective intervention for children with high callous-unemotional traits seems to be the one that is most flexible to each child's unique emotion processing experience associated with callous-unemotional traits (Waller et al., 2013). Parents who lack in sensitivity to distress cues may not be able to have the sensitivity and flexibility to shape their interaction with their child with callous-unemotional traits to promote empathy and sensitive responsiveness to emotions in their child potentially resulting in an ineffective and unresponsive parenting style.

Child-Driven Effect on Parent Responsiveness

Until recently, explanations of this social effect have been predominantly focused on a parent- driven effect. However, previous research revealed that a child-to-parent effect on parenting style driven by children with high callous-unemotional traits seems stronger than a parent-to-child effect itself (Larsson, Viding, & Plomin, 2008). Indeed, the children's callous-unemotional behaviour has been found to elicit responses in the parents such as harshness and inconsistent parenting (Larsson et al., 2008) as well as a lack of sensitive responsiveness towards their child. In line with this idea of a child-driven effect on parenting, boys with callous-unemotional traits are more likely to display an insecure and disorganised style of attachment (Pasalich

et al., 2012) characteristic of an incoherent and inconsistent response to the attachment figure. With child behaviour being less consistent and predictable, parents may demonstrate greater insensitivity towards emotion expression displayed by the children. As parents have difficulties finding a way to interact with their children successfully and in a positive manner, they increasingly feel a sense of failure and helplessness. In turn, parents find it increasingly difficult to respond in a sensitive and warm manner towards their children because of their children's unresponsiveness (Goldberg, 1977).

The Role of Parent-Child Mutual Responsiveness for the Quality of their Relationship

Such evidence for a child and parent-driven effect suggests that focusing predominantly on one-sided effect presents an incomplete picture as to why children with high callous-unemotional traits lack in emotional engagement with their environment; instead, such evidence supports a bi-directional effect between parents and child. In previous research, mothers of young children with callous-unemotional traits have demonstrated a negative emotion socialisation style reflecting an attitude which is less accepting of their children expressing negative emotion experience (Pasalich et al., 2014). Indeed, children with high levels of callous-unemotional traits have described their parents as lacking in warmth and involvement in their lives (Pardini et al., 2007). Given that parents whose children were rated as high callous-unemotional in the present study also exhibited such an insensitivity to distress cues and had mistaken such cues as rejection. Hence, parents may perceive their children's distress as a personal rejection of themselves and may respond negatively towards their children's emotion expressions. In addition, the children with high

callous-unemotional traits in the present study have responded to their parents' affection in a rejecting manner confirming how parents perceive them. In turn, the children's rejecting response may prevent a warm and responsive parenting style. Hence, as parents perceive their children's behaviour as rejection and respond negatively, the children may also perceive their parents' behaviour as negative and insensitive trapping parents and children in a cycle of insensitive responding and a lack of reciprocity. The result is that parent and child fail to form a positive and warm bond. In addition, given a similar temperament between parents and children is highly likely within the concept of callous-unemotional traits, such a bi-directional effect may be enhanced further (Hawes et al., 2011). In fact, it is temperament-environment interaction which may present a more complete picture of how children with high callous-unemotional traits and their parents influence each other rather than independent mechanism of socially driven effects between parent and child behaviours (Larsson et al., 2008).

The present research suggests a model that puts parent-child mutual responsiveness in its focal point rather than one-directional social effects. As discussed previously, parents' ability to respond to their child in a sensitive manner was thought to promote reciprocation in their child (Kochanska et al., 2008). In turn, parent-child mutual responsiveness promotes quality of parent-child relationships, specifically relationship security. Successful socialisation of emotions between parents and child, and eventually, internalisation of emotion understanding by the children lies in an intimate and secure bonding between parents and child. Such intimate and secure bonding does not imply that parents display positive affect at all times (MacDonald, 1992), but imply that parents use discipline and negative affect that is sensitive to the children's emotion states and needs to regulate child

behaviour. In contrast, ineffective parenting uses discipline and negative affect that is not sensitive to the child and can often appear inconsistent. Because children with callous-unemotional traits have difficulties forming meaningful and close connections with others (Gao, Raine, Chan, Venables, & Mednick, 2010), they are vulnerable to harsh and inconsistent parenting as risk factors for maladaptive behavioural outcomes. It is about the quality and security of their relationship which is reflected by a mutual responsiveness.

Finally, following a discussion of how parents and children with high callous-unemotional traits can influence each other, it has become clear that children with callous-unemotional traits *are not left cold* by their parenting experience, specifically an insensitive parenting style (Waller et al., 2013, for a systematic review). This challenges an early conceptualisation of callous-unemotional traits in children which saw these children as mostly unresponsive to early negative parenting (Wootton et al., 1997). Also, this reiterates the importance of studying callous-unemotional traits in early childhood. Therefore, the present thesis supports a theory that dealing with early problems associated with callous-unemotional traits, e.g. reduced attentional cueing or lack of emotional engagement, together with their parents may help these children to change course early.

5.3 **Methodological Limitations**

Some limitations of the present research have already been mentioned in preceding chapters, such as limitation of the nature of the samples. As the construct of emotion understanding is the overarching theme in this thesis, there are some

fundamental constraints in measuring emotion understanding in children, adolescents and adults discussed in the following section. Additional limitations concerning the examining sex differences will also be considered.

Assessment of Emotion Understanding

The assessment of emotion understanding as a construct across different age groups varies considerably and has their own challenges within each age group. For instance, in order to keep young children engaged with the task, it is of benefit to use a playful assessment of emotion understanding in young children which is also appropriate to their verbal abilities (Denham, 2006). At the age of 3 to 5 years, the Affective Knowledge Test (AKT; Denham, 1986) is ideal for assessing children's emotion understanding as it requires less verbal input by the child and as it's embedded in play to maintain children's attention. However, the use of the AKT has an upper age limit as older children start to understand more complex emotions. Starting around the age of 5 years, assessment of emotion understanding using the AKT can reach a ceiling and may require a more complex measuring tool involving verbalisation of causes of emotions and understanding simultaneous emotions such as the Denham's Puppet Causes Task (Denham, 2006; Denham, Zoller, & Couchoud, 1994). In addition, measurement of emotion understanding in adolescents and adults differs to that for young children. Often, isolated static or dynamic emotion expressions on a computer screen in an emotion labelling task are used in research including the present one. This is in contrast to the AKT where emotion expressions are set in a social context. Comparison and correlations across emotion understanding construct need to be considered in respect to how each construct was assessed.

Furthermore, the use of a simple labelling task with adolescents who demonstrated patterns of disruptive behaviour has its own challenges. That is, children and adolescents between the ages of 11 and 16 years did not necessarily consider labelling emotion expressions on a computer screen as highly engaging, so that some refused to continue or continued, but may have lost interest and attention was drifting. Recent research has noted that reduced findings for emotional stimuli may be attributable to a lack of interest in the task (Fanti et al., 2015). This is also consistent with some items describing the profile of callous-unemotional traits in the Inventory of Callous-Unemotional Traits, e.g. "does not like to put the time into doing things well" or does not "seem[s] motivated to do his/her best in structured activities" (ICU; Frick, 2004). Thus, adolescents losing interest in the task over time may explain some of the inconsistencies between the present findings and previous research, specifically with respect to a failure to replicate an impairment in recognising sad and fear expressions.

Sex Differences within Parent-Child Interactions

Finally, the way parents and child interact with each other may vary according to the sex of the child and the parents. For instance, rates of callous-unemotional traits, disinhibition and antisocial behaviour are generally considered higher for males (Nicholls, Ogloff, Brink, & Spidel, 2005; Verona, Sadeh, Javdani, Salekin, & Lynam, 2010). In addition, the style of interactions between parents and their children can look different as a function of the sex of the parents (e.g. Blanchard & Lyons, 2016) and the child (e.g. Carter, Garrity-Rokous, Chazan-Cohen, Little, & Briggs-Gowan, 2001). However, sex differences were not a focus of the present thesis, especially in Studies 2 and 3 as these studies did not involve a

balanced number of mothers and fathers, and the two fathers who were included did not differ in their interaction with their child. This needs to be investigated in future research as their roles as attachment figures can be equally influential as both can form a secure attachment with their children (DeKlyen, Speltz, & Greenberg, 1998). However, the nature of the roles as attachment figures can vary between of mothers and fathers. Specifically, children seek their mother's comfort when they are in distress. In contrast, the father's relationship with their child is that of physical stimulation, playfulness and protection. Research linking adult psychopathy to parental bonding has demonstrated that the relationship these adults recall with their mother and father were disrupted in different ways; that is, these adults recalled a lack of maternal care by their mothers and lack of paternal overprotection by their fathers (Gao et al., 2010). Additionally, the nature of the relationships of fathers and mothers to girls and boys differs in terms of modelling gender-appropriate behaviour and identity formation (DeKlyen et al., 1998). Given the positive effect parenting can have on callous-unemotional traits and behavioural trajectories, distinct strategies to form a meaningful bond between mothers and fathers with boys and girls may need to play a more prominent role in future research.

5.4 Mutual Responsiveness and Attachment Security: Future Directions for Working with Families and Their Children with Callous-Unemotional Traits

The body of research concerning emotion understanding in children and adolescents with high levels of callous-unemotional traits indicates that there are

emotional correlates associated with child and adolescent callous-unemotional traits (e.g. Ciucci, Baroncelli, Golmaryami, & Frick, 2015) indicating a distinct way this group of children and adolescents perceive and respond to their emotional environment. The present thesis added to this body of research by revealing and discussing two different aspects of callous-unemotional traits in children and adolescents that influence the way these individuals perceive and respond to their environment. First, these individuals demonstrate an impaired emotion processing deficit that is not limited to fear and sadness, but extends to other negative emotions. Second, parents of callous-unemotional children demonstrate a similar impaired emotion processing which contributes to their child's lack of engagement with his or her environment. However, the current research raises a number of further questions about the link between callous-unemotional traits and child emotion understanding, and the way parents can make a difference with their children's emotional development. The following will consider how further research can shape future research directions and intervention strategies.

Callous-unemotional traits have been considered in preceding chapters as important for the study of the development of child and adolescent antisocial behaviour to subtype a distinct pathway to antisocial behavioural outcomes, but more research is needed on children with these traits without the trajectory of severe antisocial behaviour. In the current body of research, callous-unemotional traits and antisocial behaviour have shown that they are asymmetrically related to each other; that is, antisocial behaviour mostly occurs without callous-unemotional traits, but callous-unemotional traits rarely are considered outside the context of problem behaviour and social maladjustment. Nevertheless, callous-unemotional traits can occur even in the absence of severe antisocial behaviour (Viding & McCrory, 2012).

In subclinical populations with low levels of antisocial behaviour compared to clinical populations, levels of callous-unemotional traits may be lower, but still demonstrate considerable variance across the population (Falkenbach, Poythress, & Creevy, 2008). Children and adolescents with high levels of callous-unemotional traits in community samples can display a low level of social maladjustments such as problematic peer relationships, reduced prosocial behaviour and increased hyperactive behaviour. There is thus definite value in exploring callous-unemotional traits in a sub-clinical context without severe antisocial behaviour. In addition, callous-unemotional traits in the absence of antisocial behaviour at a clinical level may be able to give some indication of protective factors such as parenting and attachment security that could offset risks of elevated levels of antisocial behaviour and later manifestations of psychopathic traits (Frick & White, 2008). Therefore, future research may benefit from increased emphasis on studying children high in callous-unemotional traits and their relationship to others such as their parents when these children have not developed antisocial behaviour.

Another area of future research is looking at attachment security which can be seen to be one aspect of the quality of parent child relationships. Attachment security in previous research was not directly associated with children's emotion understanding skills (Farrant, Maybery, & Fletcher, 2013); instead, a secure attachment relationship between parents and children is the foundation for positive, warm and reciprocal parent-child interaction (Kochanska et al., 2010). Secure attachment serves as protection from the negative effects of ineffective parenting and defuses a potential trajectory of maladaptive outcomes (Kochanska, Barry, Stellern, & O'bleness, 2009). Given that young children with callous-unemotional traits respond well to warm and responsive parenting (Waller et al., 2013), securely

attached children with callous-unemotional tendencies may be more resilient to ineffective parenting. Indeed, attachment security was found to have a protective effect between ineffective and harsh parenting on child aggressive outcomes (Cyr, Pasalich, McMahon, & Spieker, 2014). In addition, others have suggested that attachment-related emotions may capture the attention of children with callous-unemotional traits (Dadds et al., 2015); that is, emotion expressed by attachment figures captures these children's attention to attend to salient stimuli. In this way, the ability to read other's emotional states in children with high levels of callous-unemotional traits could improve. However, current research does not provide sufficient evidence that these children can form such an intimate and secure bond with others.

Pervious research points towards a lack in forming a secure bond with their parents. Specifically, an insecure attachment style was associated with psychopathic traits (e.g. Cyr et al., 2014; Gao et al., 2010) which is predominantly classified as a disorganised attachment (Schimmenti et al., 2014). A disorganised attachment behavioural style is characteristic of an inconsistent strategy for organising responses specifically in situations of stress and when in need of comfort and security (Lyons-Ruth, 1996). Children who display high levels of callous-unemotional traits and show an insecure disorganised attachment style are more likely to be unpredictable in their behaviour towards their attachment figure such as alternating between avoidant and approach behaviour. Findings of Study 3 support this idea as those children with high callous-unemotional traits were more likely to show a dismissive response towards parental affection. Additionally, the parents are often left helpless how to respond to their child sensitively (Lyons-Ruth, 1996). Therefore, a positive

reciprocal parent-child relationship is interrupted resulting in difficulties forming a secure attachment between them.

Finally, sufficient evidence that these children with their caregivers lack in secure attachment is missing. Apart from one study (Pasalich et al., 2012), previous research linking psychopathic traits and attachment security relied solely on adults' recalled childhood experience for the assessment of their attachment to their parents (Blanchard, Lyons, & Centifanti, 2016; Frodi, Dernevik, Sepa, Philipson, & Bragesjö, 2001; Schimmenti et al., 2014). Reports of early childhood experience of psychopathic individuals point to a disrupted bonding with their caregivers and often abuse and neglect (Gao et al., 2010). There are some problems with retrospective studies sometimes as long as 28 years ago. First, reports can be inaccurate, incomplete and biased. In conversation with adult offenders who were rated as high psychopathic, offenders often remembered extreme reactions when upset, fixated on aspects of their relationship with their caregivers, such as an idealisation of mothers, or accounts were often not very coherent or consistent (Frodi et al., 2001). Second, the use of retrospective reports considerably limits and presents a lack of control for research investigating a protective effect of attachment security for children with callous-unemotional traits. Given that callous-unemotional traits and associated maladaptive behaviours improve following parent-focused intervention, more research needs to be done on the affective quality of parent-child relationship and the effect of secure attachment in the context of child callous-unemotional traits. Specifically, security of attachment may have a positive effect on the impairment to identify negative emotions such as distress associated with callous-unemotional traits. However, research on the impact of security attachment is inconsistent. For instance, some suggest that emotions expressed by attachment figures may catch the

attention of these children (Dadds et al., 2015). Other research suggests the children with high levels of callous-unemotional traits engage in reduced eye gaze with attachment figures (Dadds et al., 2011). Thus, there is a definite need to clarify the role of attachment security within relationships of children and adolescents with callous-unemotional traits.

5.5 **Final Conclusions**

Emotions can help guide people's behaviour; that is, emotions guide through the way people perceive and experience them. Children and adolescents with callous-unemotional traits are thought to be disconnected from their emotional environment with a lack of attention to salient emotional cues and emotional experience resulting in a lack of empathy towards others. It is the current understanding that this lack of empathy is key to their trajectory of antisocial behaviour, and that their distinct understanding and experience of their emotional environment distinguishes them as a subgroup within the development of antisocial behaviour. With this research, the aim was to gain a better understanding of how children and adolescents with high callous-unemotional traits perceive and respond to their emotional surroundings and the role of their parents play in the children's lives.

Finally, the three main messages of this thesis are: first, the present findings provide support for a theory that children and adolescents with high levels of callous-unemotional traits demonstrate a lack of engagement with their emotional environment which influences their attention to salient emotional cues, and

consequently, affects accurate understanding of such cues. Specifically, these individuals show an insensitivity towards negative emotional stimuli in their environment that can also be extended to pain expressions in another person. However, present findings did not support a theory of a specific impairment of processing fear and sadness expressions as previously associated with callous-unemotional traits. The present research suggests that future investigations may need to move away from an exclusive model that focuses on a fear processing impairment. Second, this thesis also consolidates further the importance of studying callous-unemotional traits in adolescents and young children while taking into consideration problems previously outlined. This importance of studying callous-unemotional traits also extends to the parents of these children and adolescents as the parents themselves may exhibit a similarly impaired perception and response to their emotional environment. Third, this thesis presented support for the importance of parents' sensitivity to their emotional environment, specifically in respect to negative emotional cues such as sadness, to help children engage with their emotional environment. The parents' influence seems particularly crucial for children with high levels of callous-unemotional traits.

It was suggested that the lack of emotional engagement with the emotional environment in these children may be an early indication of future impairment of emotion understanding. In addition, the present thesis suggests that impaired emotion understanding in children with callous-unemotional traits may start even earlier than that. In fact the present thesis takes the view that impaired emotion understanding in these children start as early as parents' own poor emotion understanding. Perhaps, the key to scaffolding an accurate internal representation of the children's emotional environment, specifically in regards to negative emotions, is

parent-focused intervention which is flexible enough to take into consideration the unique affective perspective of parents and their children with elevated levels of callous-unemotional traits. In this way, parents can encourage mutual responsiveness between them and their child which contributes to a warm and secure parent-child relationship. Therefore, even in children with high levels of callous-unemotional traits the "spark of human concern for others", that is empathy, may be *ignited* (Hoffman, 2001, p.3). It is about the quality of their relationship with parents and others that matters.

6 References

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7 Appendices List

APPENDIX A – Assessment of Emotion Understanding

7.1 Emotion Labelling Stimuli

7.1.1 Image Examples of Dynamic Facial Expressions (Study 1)

Happy **Fear** **Disgust**

Angry **Sad** **Pain**

7.1.2 Image Examples of Dynamic Patch-Light Body Expressions (Study 1)

Angry (arms raised and moving forwards, elbows bent, fast movements)

Sad (torso bent forward, both hands covering the face, slow movements)

Happy (arms raised and stretched, jumping, fast movements)

7.1.3 Examples of Static Facial Expressions (Study 2 & 3)

Disgust **Fear** **Sad**

Happy **Surprise** **Angry**

7.2 Affect Knowledge Test (AKT; Denham, 1986)

7.2.1 Four Emotion Detachable Faces for Puppet:

Sad **Angry** **Happy** **Scared**

7.2.2 AKT – Parent Questionnaire

PARENT QUESTIONNAIRE

Name: _____

Subject # _____

Please circle the emotion you think your child would be most likely to display in the following situations: (If you have not seen a situation, try to predict what your child would feel.)

1. Coming to preschool. **Happy** **Sad**
2. Going to the airport, seeing the airplane, etc., but also seeing a parent off on a trip. **Happy** **Sad**
3. What is your child's favorite food, which makes him/her very happy?
   Least favorite _____
4. Coming in from playing outside when you call him/her for dinner. **Happy** **Angry**
5. Seeing a big although friendly dog. **Happy** **Afraid**
6. Going into the water at the swimming pool. **Happy** **Afraid**
7. Some other kids would not let him/her play. **Angry** **Sad**
8. He/she is told that he/she has to stay home while everyone else in the family goes to get ice cream. **Angry** **Sad**
9. A brother or sister punches him/her, and says that if he/she tells Mom or dad, theywill hit him/her again. **Angry** **Afraid**
10. Getting a spanking. **Angry** **Afraid**
11. After doing something naughty, a parent says if they do it again, they will have to be punished. **Sad** **Afraid**
12. Experiencing the death of a fairly close friend or member of the extended family. **Sad** **Afraid**

7.2.3 **AKT- Experimenter Script**

Puppet Situations Part 1 Script: (stereotypical)

[sibs] 1. **HAPPY**:
NANCY/JOHNNY: *"Hi! I'm Nancy/Johnny. Here is my brother/sister. Ah! She/he gave me some ice cream. YUM, YUM!!"* (HAPPY)

[sibs] 2. **SAD**:
NANCY/JOHNNY: *"We are walking home."*
SIB: *"I am going to push you down!!"*
NANCY/JOHINNY: *"Ow!! it hurts!! OWW!!"* (SAD)

[sibs] 3. **MAD**:
NANCY/JOHNNY: *"I just finished building this tower, and I feel really good about it. Doesn't it look good?"*
SIB: *"No! I think it looks yuckky. I'm going to knock it down!" CRASH!!*
NANCY/JOHNNY: (MAD)

[child] 4. **SCARED**: Shhhh!! Nancy/Johnny is asleep.
NANCY/JOHNNY: *"Ooh, I am dreaming. There is a tiger chasing after me!! OH NO!!"* (SCARED)

[sibs] 5. **HAPPY**:
NANCY/JOHNNY: *"Here comes Mommy. Mommy is going to take me to the zoo. Come on, Nancy/Johnny. Let's go see the animals. Oh, I love the elephants. Here we go! Bye, bye!"* (HAPPY)

[child] 6. **SAD**:
NANCY/JOHNNY: *"I am going to go ride my Big Wheel. Where is it? Someone took it! It's gone! Someone stole it."* (SAD)

[child] 7. **SCARED**: Nancy/Johnny is all alone.
NANCY/JOHNNY: *"It's really dark in here. There's no one around. 00OOOOO."* (SCARED)

[mom/child] 8. **MAD**:
NANCY/JOHNNY: *"I don't like to eat cabbage!!"*
Mom: *"You have to eat it, and that's that!"*
NANCY/JOHNNY: *"Ugh! No! No!"* (MAD)

7. [sibs]
Nancy/Johnny: *"We are playing blocks. We're building a house."*
Sib: *"I'm going to play with Jimmy, and you can't come. P00 P00 on you!"*

A. **MAD:** (Nancy/Johnny behaviorally expresses the emotion)

B. **SAD:** (Nancy/Johnny behaviorally expresses the emotion)

8. [mom/child]
Mom: *"We are going to get some ice cream at the ice cream store, but you have to stay home. Bye, Bye."*

A. **MAD:** (Nancy/Johnny behaviorally expresses the emotion)

B. **SAD:** (Nancy/Johnny behaviorally expresses the emotion)

9. [sibs]
Sib: *"You are a bad brother/sister." [punches] "If you tell Mommy or Daddy I hit you, I will do it again, harder.*

A. **MAD:** (Nancy/Johnny behaviorally expresses the emotion)

B. **SCARED:** (Nancy/Johnny behaviorally expresses the emotion)

10. [mom/child]
Mom: *"You did a bad thing."* Mom gives child a spanking.

A. **MAD:** (Nancy/Johnny behaviorally expresses the emotion)

B. **SCARED:** (Nancy/Johnny behaviorally expresses the emotion)

11. [mom/child] Nancy/Johnny has Mother's pen and uses it.
Mom: *"Nancy/Johnny, I told you never to use my pen. If you do it again I will have to punish you."*

A. **SAD:** (Nancy/Johnny behaviorally expresses the emotion)

B. **SCARED:** (Nancy/Johnny behaviorally expresses the emotion)

12. [mom/child]
Mom: *"Grandpa died and you won't ever be able to see him again."*

A. **SAD:** (Nancy/Johnny behaviorally expresses the emotion)

B. **SCARED:** (Nancy/Johnny behaviorally expresses the emotion)

Puppet Situations Part 2 Script: (Nonstereotypical)

1. [mom/child] Here come Nancy/Johnny and her/his Mommy.

   A. **HAPPY: Nancy/Johnny:** *"We are coming to school I like it here – We have so much fun!"*

   B. **SAD: Nancy/Johnny:** *"We are coming to school I don't like it here. I miss my mommy. Don't go, Mommy!"*

2. [mom/child]
   A. **HAPPY: Nancy/Johnny:** *"We're going to the airport. Mommy is going on a trip Its really fun to see all the planes. WOW!"*

   B. **SAD: Nancy/Johnny:** *"We're going to the airport. Mommy is going on a trip I don't want mommy to go. Don't go!!"*

3. [mom/child]
   Nancy/Johnny: *"Hi, Mommy. What are you cooking?"*

   A. **MAD: Mom:** *"[favorite food]"*
   Nancy/Johnny: *"Ugh! Yuck! I won't eat it!"*

   B. **HAPPY: Mom:** *"[Least favorite food]"*
   Nancy/Johnny: *"Yum, yum. That sounds great!!"*

4. [mom/child]
   Mom: *"Come in for dinner Nancy/Johnny!"*

   A. **HAPPY: Nancy/Johnny:** *"I am swinging But I'm hungry & Mommy's food is good. I will go in. Okay, Mommy."*

   B. **MAD: Nancy/Johnny:** *"I am swinging I wanna swing. I wanna stay outside!! No, no I won't come in!"*

5. [child]
   A. **SCARED: Nancy/Johnny:** *"Here comes a big dog He looks mean; his teeth are big."*

   B. **HAPPY: Nancy/Johnny:** *"Here comes a big dog He looks nice; his big teeth are smiling at me."*

6. [sibs]
   A. **HAPPY: Nancy/Johnny:** *"We are going to the swimming pool; it's a hot day. The pool is so much fun! The water feels good!"*

   B. **SCARED: Nancy/Johnny:** *"We are going to the swimming pool; it's a hot day. I don't like this water! It's too deep! I don't want it on my face-Let me out of here!"*

APPENDIX B – I Love You Task (Study 2 and 3)

7.3 Instructions by Experimenter:

At the beginning of the session - *'After about 30 minutes where you and your child have time to play together* [including the completion of the Triangle Task]*, I'm going to come back into the room to do one more game* [AKT] *with you and* [Child's Name]. *After that game, I am going to leave the room for a couple of minutes. Once I have gone, I'd like you to look* [Child's Name] *in the eyes and show him/her, in any way that feels most natural for you, that you love him/her. Does that sound ok? So, just to clarify, when I say I am leaving the room for a couple of minutes it's then I'd like you to do this. (*If there's hesitation, the researcher may say something like *'I know it sounds a bit funny, just do whatever comes naturally to you, we're interested in different parent-child relationships and how they work'.)*

Below are the instructions the researcher will say to the parent just before the researcher will leave the room for the last time following AKT. For this reason, it makes sense that the I-Love-You task is the last task of the assessment.

'Great, that's almost it, thanks so much! One last thing before we finish, I'm just going to leave the room one more time to get something. I'll only be a couple of minutes but whilst I am gone I'd like you to congratulate each other on how well you've both done today. You've done such a great job, thank you. I'll be back in a few minutes'.

7.4 I-Love-You Coding

Code across **only** first two attempts, regardless of number of attempts.

Code for parent and child.

Coding for data entry shown in square brackets [ ]

7.4.1 Coding Sheet

	None [0]	Momentary (less than 1 second) [1]	1-3 seconds [2]	3-5 seconds [3]	>5 Seconds [4]
Was there an interval of mutual 'locked' I gaze?					

7.4.2 **Parent codes**

Did the parent…

	[1] Not at all	[2]	[3]	[4]	[5] Very much so
Appear comfortable with child in the task context					
Appear genuine with child in the task context					
Initiate or attempt physical affection					
Reject physical affection attempt by child					
Say words of affection					
Say negative/rejecting words					
Initiate or attempt I contact with child					
Reject I contact attempt by child					

	Yes	No	No. of times (tally)
Say 'I love you'			
Attempt the task?			N/A

7.4.3 **Child codes**

Did the child…

	[1] Not at all	[2]	[3]	[4]	[5] Very much so
Appear comfortable with parent in the task context					
Appear genuine with parent in the task context					
Initiate or attempt physical affection					
Reject physical affection attempt by parent					
Say other words of affection					
Say negative/rejecting words					
Initiate or attempt I contact with parent					
Reject I contact attempt by parent					

	Yes	No	No. of times (tally)
Say 'I love you'			

7.4.4 Coding Criteria (in detail)

Was there an interval of mutual 'locked' eye gaze?

If eye contact is made between parent and child, record how long it lasts and tick the appropriate box. *Locked* eye gaze occurs when parent and child are looking into each other's eyes and is broken when either one looks away, turns their head or breaks eye contact in any way. This time does not have to be silent though, parent and child can be engaging in conversation or a game at the same time.

Appear comfortable with child / parent in the task context

Does the parent/child seem comfortable with each other during the 1.5mins of the task? A score of 4 or 5 would represent the parent and child appearing comfortable in each others presence during the 1.5 minutes. A parent would score poorly (e.g. 2) on this variable if they seemed awkward with the task – as if they weren't sure what to do or how to do it or if their words or actions expressed discomfort. A child would score poorly if they did not seem relaxed with their parent in this context or if their reaction to the task was negative or avoidant. A score of 1 would indicate the parent actively avoids the task throughout the entire 1.5 minutes (e.g. instructs child to do something such as begin to get ready to leave) with no attempt to carry out instructions given by the researcher. It is important to assess parent's behaviour as 'task orientated' and the child's as 'responsive' as the child has only heard the instruction to congratulate each other on how well they've both done.

Appear genuine with child / parent in the task context

A good score on this variable would require the child/parent to seem as if they were acting and responding normally and not putting on a front for the cameras. This variable can often be difficult to tease apart from the previous variable as a parent/child that seems uncomfortable may also seem not genuine. A score of 1 would be given if it was felt that the parent was not sure what to do in the situation and was acting it out in what the observer feels is an unnatural way. Scores for this item can only be based on the individual task and not the overall assessment session. Therefore the reciprocal behaviour and comments of the child/parent during this task can also be used to judge whether the parent/child is behaving in a way that the other finds unnatural.

Initiate or attempt physical affection

To what extent does the parent/child initiate, or try to initiate, physical affection? Physical affection could be anything from a kiss or a cuddle to a gentle touch, game of tickling or stoke of the hair. Include anything that involves physical contact in a positive manner. A brief initiation of positive contact by either parent or child might receive a score of 3 whereas a brief display of intense affection, if perceived to be genuine, would receive a score of 4. A score of 5 would be given to enduring displays of seemingly genuine affection.

Reject physical affection attempt by child / parent

To what extent does the parent/child reject physical affection? A rejection of physical affection could be a movement away from the other person, smaller movements of the head or arms, changes in body language/posture indicating a

rejection of the other or physical violence. When rating this think about the intensity and intentionality of the rejection. Direct rejection (e.g. physical violence, pushing away or verbal instruction to go away) would receive a score of 4 or 5 whereas more subtle and less intense forms (e.g. crossing of the arms or turning body/face away whilst maintaining close proximity) would receive a score of 2 or 3.

Say other words of affection

To what extent are words of affection (other then "I love you") said by parent/child? Do not include statement that infer affection but do not explicitly express it, such as a child saying "I don't want you to go and leave me with the researcher."

Say negative/rejecting words

To what extent are negative/rejecting words directed to the other person? When coding verbal rejections, be aware of the pragmatics rather than just the semantics – seemingly rejecting statements may be non-rejecting depending on the context and style in which they are said. In coding this, the reaction/comments of the recipient can be used to judge the intensity of the rejection and/or criticism.

Initiate or attempt eye contact with child / parent

To what extent does the parent/child initiate, or try to initiate, eye contact with the other person? This could be a verbal command such as, "Look at me" or any movement that is made to try to create eye contact including indirect eye contact (e.g. visually engaging with the other through the reflection in the mirror). A brief glance might receive a score of 2 whereas more expected incidences of eye contact,

for example during mutual conversation, might receive a score of 3. Scores of 4 or 5 would be given where the parent/child's attempt to engage in eye contact has a feel of intentionality and where these types of attempts occur more than once throughout the task. The avoidance of eye contact would suggest a low score on this variable but not necessarily – a person may avoid eye contact initiated by others but initiate it themselves.

Reject eye contact attempt by child / parent

To what extent does the parent/child reject the other's attempt at eye contact? Rejection of eye contact might be physical, such as turning the head, putting hands in front of their face or shutting their Is; it could also be a verbal command such as, "Go away" or "Stop looking at me". A low score on this variable would infer no difficulty in retaining eye contact with the other person.

Say 'I love you'

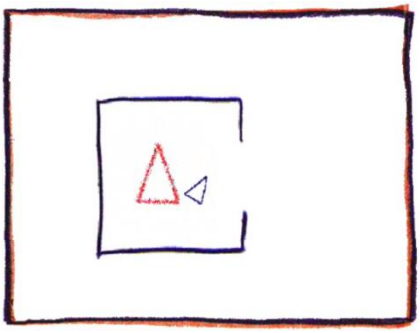
Did the parent/child say the words "I love you"? If so, tally how many times? Other statements such as "I love you so much" or "I really love you" are permitted but responses such as "I love you too" or "So do I" do not count.

APPENDIX C - Emotion Attribution-Triangle Task (Frith et al., 2000) (Study 2)

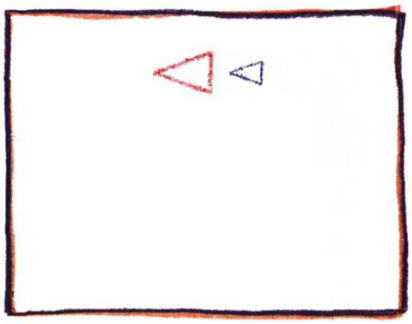
7.5 Animations

7.5.1 Theory of Mind Animations:

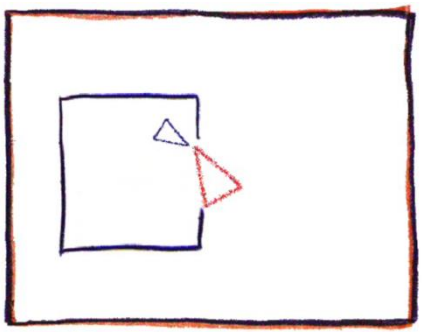
Coaxing



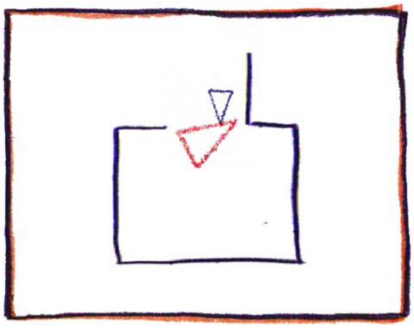
Mocking



Seducing

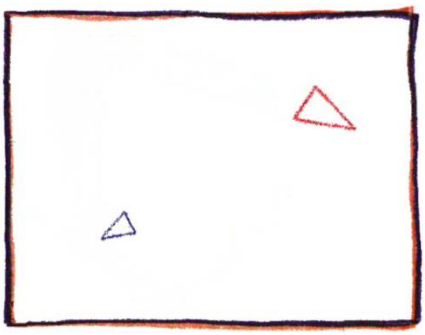


Surprising

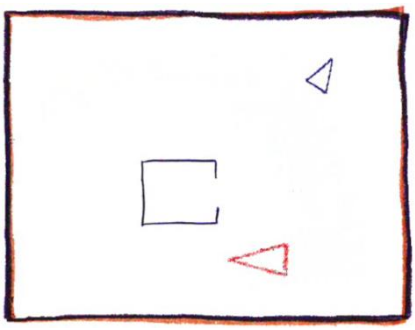


7.5.2 **Random Animations**

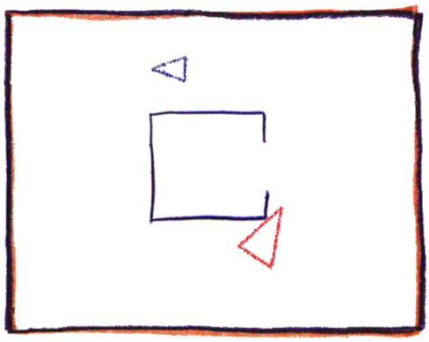
Billiard



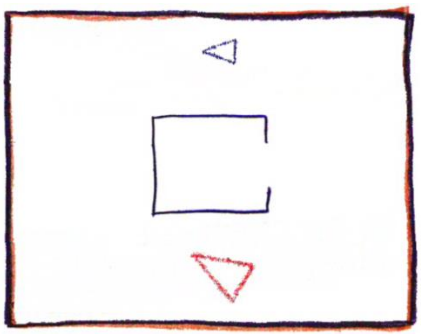
Drifting



Star



Tennis



7.6 **Coding Instructions**

7.6.1 **Intentionality Scores**

0= action, non deliberate.

a) bouncing off
b) moving around
c) rotating

1= deliberate action with no others.

a) Ice-skating

b) swimming

c) escaping

2= deliberate action with somebody else. (implies simultaneous actions)

1) fighting

2) following

3) talking

4) racing

3= deliberate action in response to other's action. (implies sequential actions)

i) chasing

ii) guarding

iii) is trying to do something

iv) searching

4= deliberate action with reference to mental states.

i) mocking

ii) mimicking

iii) arguing

iv) encouraging

v) teasing

vi) being happy

vii) being friendly

viii) hiding

ix) is trying to get the other to do something

x) wanting

xi) know

5= deliberate action with explicit goal of effecting other's mental state.

d) surprising

e) pretending

f) persuading

1. convincing

7.6.2 **Appropriateness Scores**

Each description was scored 2, 1, or 0 according to how accurately it reflected the sequence.

2 = spot-on description of the story or the actions represented. It may be concise just capturing gist, as well as discursive.

1 = partial description of the sequence, description is related to the sequence, but imprecise or incomplete.

0 = "don't know answers", or descriptions that focus solely on a minor aspect of the sequence.

Theory of Mind movement sequences

Mental state attribution*: use of mental state verbs to describe reciprocal interactions,*

e.g. wanting; hiding; tricking; pretending; being naughty;

NOT: complex goal-directed interaction, e.g. chasing each other round the house; x pushing y out of the way; NOT: solely direct speech, NOT: solely 'trying to'

Coaxing*: (animation with enclosure)*

2 *= description that conveys idea of little triangle's reluctance to go out and big triangle's attempts to get the little one out (e.g. persuading, coaxing).*

1 *= partially correct description focusing on one aspect of the story or one character only,*

(e.g. little doesn't want to go out; or, big is pushing little to go out)

0 *= actions that do not relate to the events or relate to a very minor aspect of the sequence only (e.g. the two triangles didn't like each other)*

***Mocking**: (animation with enclosure)*

***2** = description that conveys idea little triangle is copying big one with the intention of not being noticed (e.g. pretending, hiding, being naughty)*

***1** = partially correct description, (e.g. following, pursuing, copying, chasing)*

***0** = description that does not relate to the events (e.g. big triangle not interested) or relate to a very minor aspect of the sequence only (e.g. little triangle ran away)*

***Seducing**: (animation with enclosure)*

***2** = description that conveys the little triangle is trapped in and escapes by persuading, tricking the big one (e.g. Little convince in a seductive way to let him out)*

***1** = partial story with minimal action for each character, e.g. Little trying to escape*

***0** = description which is too minimal, e.g. she got out, or unrelated to the sequence.*

***Surprising**: (animation with enclosure)*

***2** = any mention of tricking, surprising, hiding, hide and seek*

***1** = description which gives part of the story but misses the critical point (see above)*

***0** = description not related to any of the events in the sequence, or focus solely on a minor part of action (e.g. knocking on the door)*

Random movement sequences

Billiard, Drifting (animation with no enclosure)**;**

Star, Tennis (animation with enclosure)

2 = descriptions implying random or purposeless movement including moving about, bouncing off the walls or dancing as in dancing lights.

1 = purposeful movement without interaction, including turning round and getting dizzy, or dancing in a circle

0 = purposeful movement implying interaction between the triangles including copying each other

APPENDIX D – Intra-Class Correlation Coefficients

Table 7.0.1 Intra-Class Correlation Coefficients for each variable coded in Studies 2 & 3.

Variables		Intra-class Correlation Coefficients
Child		
	Rejecting Eye Contact	0.671
	Initiating Eye Contact	0.817
	Rejecting Verbal Affect	0.919
	Initiating Verbal Affect	1
	Rejecting Physical Affect	0.89
	Initiating Physical Affect	0.893
	Genuineness	0.892
	Comfort	0.899
Parent		
	Rejecting Eye Contact	0.885
	Initiating Eye Contact	0.637
	Rejecting Verbal Affect	1
	Initiating Verbal Affect	0.897
	Rejecting Physical Affect	1
	Initiating Physical Affect	0.898
	Genuineness	0.878
	Comfort	0.855